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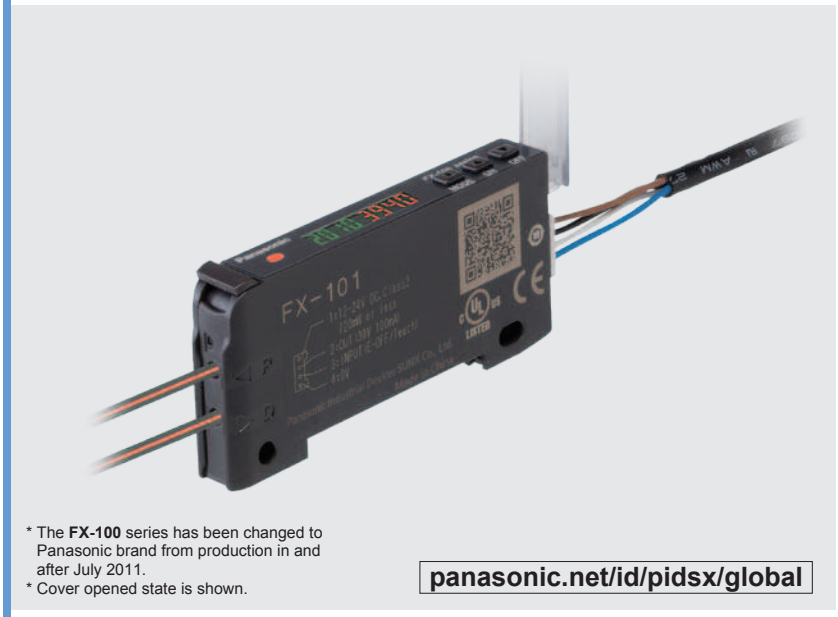
Digital Fiber Sensor
FX-100 SERIES

Related Information
■ General terms and conditions..... F-7
■ Glossary of terms / General precautions..... P.1455~ / P.1501
■ Sensor selection guide..... P.3~
■ Fiber selection..... P.5~



* The **FX-100** series has been changed to Panasonic brand from production in and after July 2011.
* Cover opened state is shown.

panasonic.net/id/pidsx/global

CE Conforming to EMC Directive

c UL us Listing

PNP output type available | Timer | Interference prevention | Light intensity monitor

Automatic sensitivity setting | Test input

Taking fiber sensors to the next level

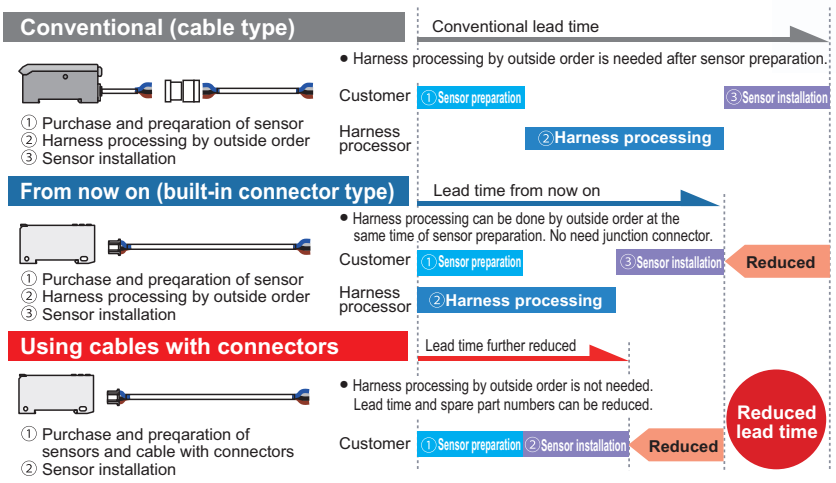
Good dual digital display

The threshold value and incident light intensity can be both confirmed at the same time, bringing good operability when making changes of each setting.

Commercially-available connectors reduce lead time and spare part numbers

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

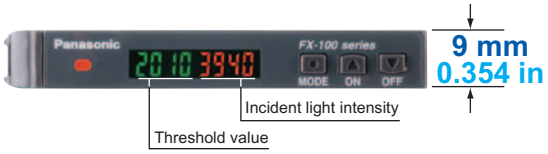
Commercially-available crimping connectors are used, so that the processing costs for connection cables can be greatly reduced.



FIBER SENSORS
LASER SENSORS
PHOTOELECTRIC SENSORS
MICRO PHOTOELECTRIC SENSORS
AREA SENSORS
LIGHT CURTAINS / SAFETY COMPONENTS
PRESSURE / FLOW SENSORS
INDUCTIVE PROXIMITY SENSORS
PARTICULAR USE SENSORS
SENSOR OPTIONS
SIMPLE WIRE-SAVING UNITS
WIRE-SAVING SYSTEMS
MEASUREMENT SENSORS
STATIC ELECTRICITY PREVENTION DEVICES
LASER MARKERS
PLC
HUMAN MACHINE INTERFACES
ENERGY CONSUMPTION VISUALIZATION COMPONENTS
FA COMPONENTS
MACHINE VISION SYSTEMS
UV CURING SYSTEMS
Selection Guide
Fibers
Fiber Amplifiers
FX-500
FX-100
FX-300
FX-410
FX-311
FX-301-F7/ FX-301-F

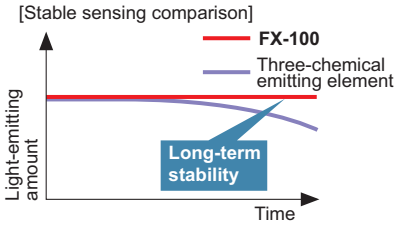
Saving-space with a width of 9 mm 0.354 in

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



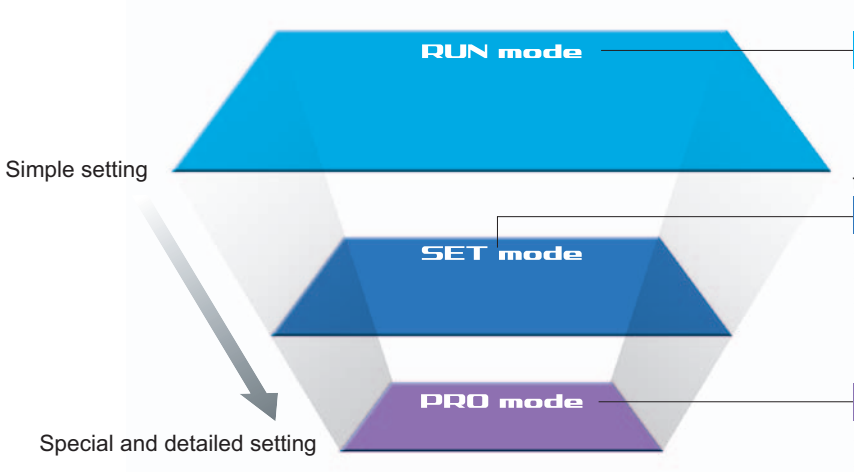
Improved stability over long terms

Utilizes “Four-chemical emitting element” for light emission. The light emission is guaranteed to be stable over long periods of time.



Simple operation due to clear configuration system

Continued to use the configuration system of digital pressure sensor **DP-100** series, which has received high popularity since its release. We have separated the settings into three levels: RUN mode, SET mode, and PRO mode, making operation simpler and easier.



Functions used during normal operation

RUN mode

- Changing threshold values
- Key lock
- Quick settings
- Code settings

Functions used when initializing the sensor and carrying out maintenance

SET mode

- Teaching
- L-ON / D-ON setting
- Timer setting
- Emission amount
- Emission frequency setting

Equipped with a full complement of digital fiber sensor functions

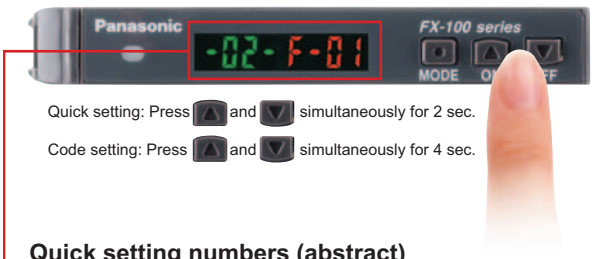
PRO mode

- Shift setting
- Reset
- ECO
- Threshold value margin
- Threshold value follow-up cycle
- External input
- GETA
- Inverting display
- Copy

Quick code input function

RUN mode

Simply imputing the default setting “code (number)” will enable sensor settings. Even if the settings are accidentally changed, imputing the code will restore the default settings.
Confirmation can be carried out smoothly via telephone by simply quoting numbers. This can be of great assistance when dealing with foreign country customers.



Quick setting numbers (abstract)

No	Output operation	Timer	Emission amount setting
-00-	Dark-ON	None	OFF
-01-	Dark-ON	None	ON
-02-	Dark-ON	OFF-delay 10 ms	OFF
-03-	Dark-ON	OFF-delay 10 ms	ON
-10-	Light-ON	ON-delay 40 ms	ON
-11-	Light-ON	ON-delay 40 ms	OFF
-12-	Light-ON	ON-delay 10 ms	ON
-13-	Light-ON	ON-delay 10 ms	OFF

Refer to “**Quick setting function**” and “**Code setting function**” in “**PRECAUTIONS FOR PROPER USE**” for details.

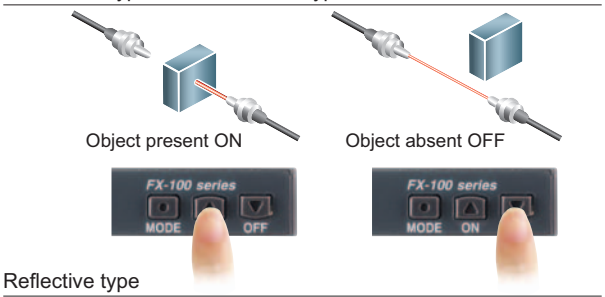
Teaching with ON / OFF keys

SET mode

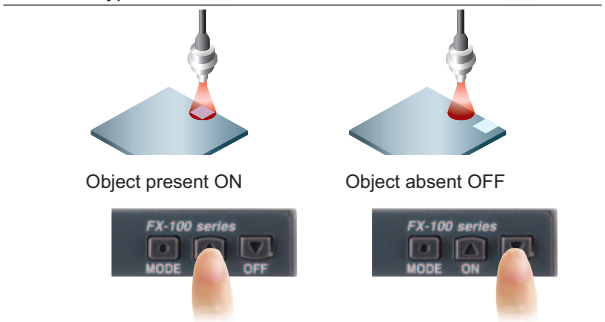
Simply press the ON key when an object is present, and OFF when it is not, and teaching is completed. There is no need to consider difference between Light-ON and Dark-ON.

<Setting example>

Thru-beam type / Retroreflective type



Reflective type



Teaching even without an object — Limit teaching function

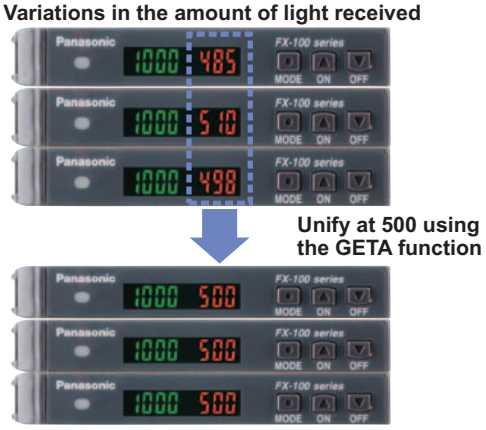
Threshold value can be set by performing teaching only when an object is absent (when the incident light amount is stable). This is useful when there are other objects in the background also when defecting a minute objects. Teaching can also be carried out using external input.

Resolves variation in incident light intensity display GETA function

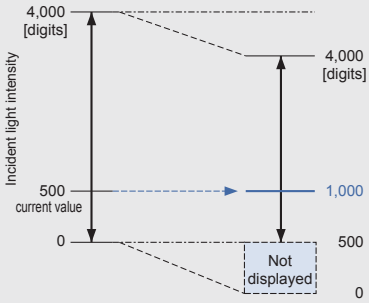
PRO mode

Even when performing the same sensing operation, there may be variances in the digital values of the fiber amp. There is no problem with the sensor itself, but the operator may find it troubling.
Given value can be corrected with the GETA function, so the apparent variation can be eliminated and the creation of operation manuals can proceed smoothly.

Variations in the amount of light received



Example of current incident light intensity display of '500' is adjusted to '1000'



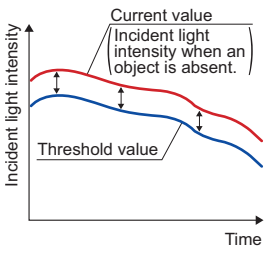
Because the original value is 500, sensor displays 500 for the lower limit value and 4,000 for the upper limit value.

Threshold value follow-up cycle setting function

PRO mode

This function performs automatic setting to threshold value by checking the incident light intensity at desired intervals in order to follow the changes in the light amount resulting from changes in the environment over long periods (such as dust). Contributes to reduction in maintenance hours.

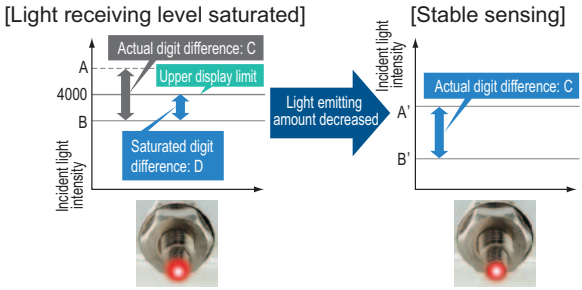
* Effective when the output operation is set to Dark-ON, and when using thru-beam type or retroreflective type fibers.



Emission amount setting function

SET mode

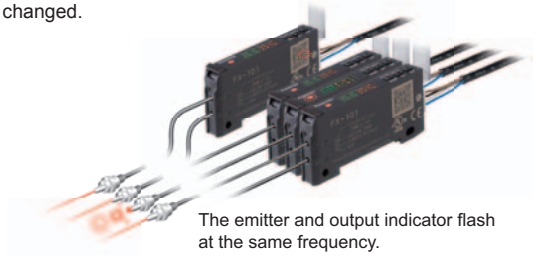
Emission amount can be reduced in order to achieve stable detection when the receiving light level is saturated, such as detection at close range and detection of transparent or minute objects. Previously, the emission amount level was only one, but from production in December 2007, four level setting (three level + auto setting) has become available. This function brings easier settings than before.



Emission frequency setting mode SET mode

Mutual interference is prevented for max. 3 units for standard type **FX-101**□ and max. 4 units in case of long sensing range type **FX-102**□.
During setting of interference prevention, emitter and output indicator both flash, so it is convenient to confirm which fiber is in the setting process at a glance. Emitter flashes even when an amplifier is not installed close together.

* When the emission frequency is changed, a response time is also changed.

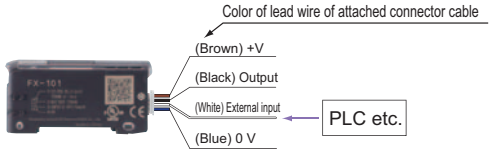


The emitter and output indicator flash at the same frequency.

External input setting mode PRO mode

External input can be selected from emission halt, limit teaching / full-auto teaching / 2-level teaching, ECO or emission amount test. Threshold value set at each teaching is also memorized.

* 2-level teaching, emission amount test and threshold value storing setting are available in amplifiers manufactured after December 2007.



External input lines are equipped as standard

Digital display inversion setting PRO mode

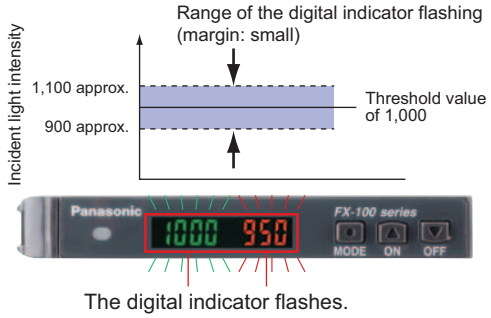
The viewing orientation of the digital display can be inverted in accordance with the setting direction of the amplifier.

Alert function PRO mode

When the amount light received approaches the threshold value, the display can be made to blink in order to alert the operator.

<When using at a shift amount of 20% and a threshold value of 1,000>

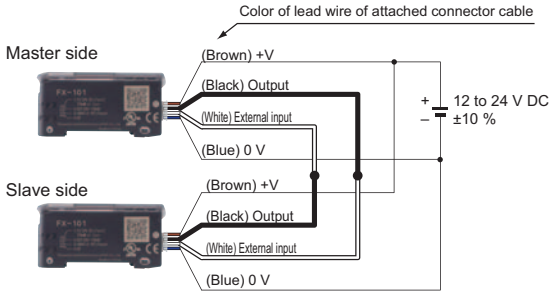
The amount of light received ranges from about 900 to 1,100 when the digital indicator flashes.



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

By connecting a fiber sensor to the master fiber sensor, the master sensor settings can be copied along with data communications. When the same settings are input to several units, trouble from setting errors can be prevented, also changes to the work order will be small when equipment design is changed.

<Wiring to copy settings>

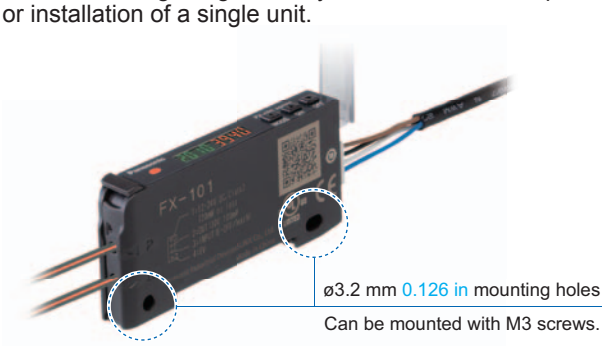


These settings can be copied

Threshold value, output operation, timer operation, timer emission amount, shift, external input, threshold value-storing, ECO inverting digital display, and threshold value margin

Without mounting bracket

Selectable either mounting on DIN rail or direct mounting with through hole.
Direct mounting brings stability even on a movable parts or installation of a single unit.



Available from standard type or long sensing range type

Standard type and long sensing range type are available which has various response time and sensing range. The model best meet application needs can be selected.

Model No.	Type	Sensing range (FT-43)	Response time
FX-101	Standard type	350 mm 13.780 in	Max. 250 µs
FX-102	Long sensing range type	970 mm 38.189 in	Max. 2.5 ms

Power consumption saving with ECO mode

When there is no key operations in approximately 20 seconds, digital display turns off and power consumption can be reduced to 600mW or less (720mW in normal mode).

ORDER GUIDE

Amplifiers

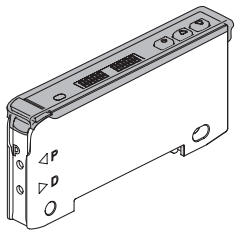
Type		Appearance	Model No.	Emitting element	Output
Standard type	M8 plug-in connector type		**FX-101** (Note 2)	Red LED	NPN open-collector transistor
			FX-101-Z (Note 3)		NPN open-collector transistor
			FX-101P (Note 2)		PNP open-collector transistor
			FX-101P-Z (Note 3)		PNP open-collector transistor
	Cable set (Note 1)		**FX-101-CC2**		NPN open-collector transistor
			FX-101P-CC2		PNP open-collector collector transistor
Long sensing range type	M8 plug-in connector 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
	Cable set (Note 1)		**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 2 m 6.562 ft **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□**.

Accessory

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

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



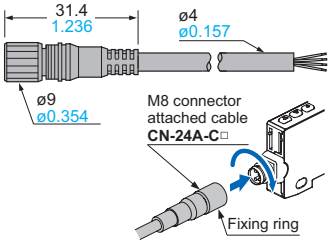
OPTIONS

Designation	Model No.	Description	
Connector attached cable	**CN-14A-C1**	1 m 3.281 ft	0.2 mm² 4-core cabtyre cable with connector on one end Cable outer diameter: ø3.7 mm ø0.146 in
	CN-14A-C2 (Note)	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**	1 m 3.281 ft	
	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**	2 m 6.562 ft	For M8 plug-in connector type The connector on one end Cable outer diameter: ø4 mm ø0.157 in
	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** Two pcs. per set	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.	

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

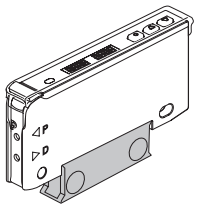
M8 connector attached cable

- **CN-24A-C□**



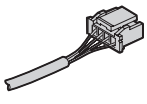
Amplifier mounting bracket

- **MS-DIN-4**



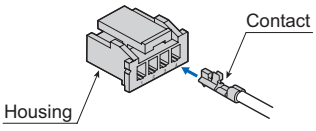
Connector attached cable

- **CN-14A(-R)-C□**



Connector

- **CN-14A**



Recommended connector

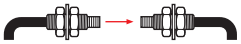
Contact: SPHD-001T-P0.5, Housing: PAP-04V-S (Manufactured by J.S.T. Mfg. Co., Ltd.)
Note: Contact the manufacturer for details of the recommended products.

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.

LIST OF FIBERS

Thru-beam type (one pair set)



Fibers are listed in alphabetic order. Refer to p.5~ "Fiber Selection" for details of each fiber.

Model No.	Sensing range (mm in) (Note 1)		Type / Ambient temperature	Fiber cable length ✂: Free-cut	Dimensions
	Standard type **FX-101**□	Long sensing range type **FX-102**□			
FT-140	14,000 551.180	19,600 771.652 (Note 2)	Threaded, M14, Long sensing range, −40 to +70 °C −40 to 158 °F	✂ 10 m 32.808 ft	P.51
FT-30	135 5.315	400 15.748	Super quality, Threaded, M3, −55 to +80 °C −67 to 176 °F	2 m 6.562 ft	P.51
FT-31	130 5.118	340 13.386	Threaded, M3, −55 to +80 °C −67 to 176 °F	✂ 2 m 6.562 ft	P.51
FT-31S	130 5.118	340 13.386	Sleeve, Threaded, M3, −55 to +80 °C −67 to 176 °F		P.51
FT-31W	80 3.150	240 9.449	Threaded, M3, −40 to +60 °C −40 to 140 °F		P.51
FT-40	320 12.598	870 34.252	Super quality, Threaded, M4, −55 to +80 °C −67 to 176 °F	2 m 6.562 ft	P.51
FT-42	300 11.811	800 31.496	Threaded, M4, −55 to +80 °C −67 to 176 °F	✂ 2 m 6.562 ft	P.51
FT-42S	300 11.811	800 31.496	Sleeve, Threaded, M4, −55 to +80 °C −67 to 176 °F		P.51
FT-42W	260 10.236	720 28.346	Threaded, M4, −40 to +60 °C −40 to 140 °F		P.51
FT-43	350 13.780	970 38.189	Threaded, M4, −55 to +80 °C −67 to 176 °F		P.51
FT-45X	340 13.386	920 36.220	Threaded, M4, −55 to +80 °C −67 to 176 °F	1 m 3.281 ft	P.52
FT-A11	1,900 74.803	3,600 141.732 (Note 2)	Wide beam, −40 to +70 °C −40 to 158 °F	✂ 2 m 6.562 ft	P.52
FT-A11W	1,700 66.929	3,400 133.858	Wide beam, −40 to +55 °C −40 to 131 °F		P.52
FT-A32	3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	Wide beam, −40 to +60 °C −40 to 140 °F		P.52
FT-A32W	3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	Wide beam, −40 to +55 °C −40 to 131 °F		P.52
FT-AL05	250 9.843	660 25.984	Wide beam, −55 to +80 °C −67 to 176 °F		P.52
FT-E13	6 0.236	19 0.748	Cylindrical, Ultra-small dia., ø3 0.118, −40 to +70 °C −40 to 158 °F	✂ 1 m 3.281 ft	P.52
FT-E23	22 0.866	80 3.150	Cylindrical, Ultra-small dia., ø3 0.118, −40 to +70 °C −40 to 158 °F		P.52
FT-H13-FM2	250 9.843	700 27.559	Heat-resistant, −60 to +130 °C −76 to 266 °F	✂ 2 m 6.562 ft	P.52
FT-H20-J20-S (Note 3)	135 5.315	420 16.535	Heat-resistant (joint), −60 to +200 °C −76 to 392 °F	✂ 200 mm 7.874 in (Note 4)	P.53
FT-H20-J30-S (Note 3)	135 5.315	420 16.535	Heat-resistant (joint), −60 to +200 °C −76 to 392 °F	✂ 300 mm 11.811 in (Note 4)	P.53
FT-H20-J50-S (Note 3)	135 5.315	420 16.535	Heat-resistant (joint), −60 to +200 °C −76 to 392 °F	✂ 500 mm 19.685 in (Note 4)	P.53
FT-H20-M1	210 8.268	540 21.260	Heat-resistant, −60 to +200 °C −76 to 392 °F	1 m 3.281 ft	P.53
FT-H20-VJ50-S (Note 3)	150 5.906	500 19.685	Heat-resistant (joint), −60 to +200 °C −76 to 392 °F	✂ 500 mm 19.685 in (Note 4)	P.53
FT-H20-VJ80-S (Note 3)	150 5.906	500 19.685	Heat-resistant (joint), −60 to +200 °C −76 to 392 °F	✂ 800 mm 31.496 in (Note 4)	P.53
FT-H20W-M1	100 3.937	300 11.811	Heat-resistant, −60 to +200 °C −76 to 392 °F	1 m 3.281 ft	P.53
FT-H30-M1V-S (Note 5)	110 4.331	280 11.024	Vacuum-resistant, −30 to +300 °C −22 to 572 °F		P.53
FT-H35-M2	170 6.693	490 19.291	Heat-resistant, −60 to +350 °C −76 to 572 °F	2 m 6.562 ft	P.53
FT-H35-M2S6	170 6.693	490 19.291	Heat-resistant, −60 to +350 °C −76 to 572 °F		P.53
FT-HL80Y	990 38.976	2,340 92.126	Chemical-resistant, Metal-free, −40 to +115 °C −76 to 239 °F	✂ 2 m 6.562 ft (Note 6)	P.53

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) Heat-resistant joint fibers and ordinary-temperature fibers (**FT-42**) are sold as a set.
4) This is the fiber length (fixed length) for heat-resistant fibers. The ordinary-temperature fibers are free-cut to 2 m 6.562 ft.
5) Sold as a set comprising vacuum type fiber + photo-terminal (**FV-BR1**) + fiber at atmospheric side (**FT-J8**).
6) The allowable cutting range is 500 mm 19.685 in from the end that the amplifier inserted.

LIST OF FIBERS

Thru-beam type (one pair set)

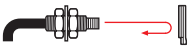
Fibers are listed in alphabetic order. Refer to p.5~ “Fiber Selection” for details of each fiber.

Model No.	Sensing range (mm in) (Note 1)		Type / Ambient temperature	Fiber cable length ✂: Free-cut	Dimensions
	Standard type **FX-101**□	Long sensing range type **FX-102**□			
FT-KS40	2,200 86.614	3,600 141.732 (Note 2)	Narrow Beam, −40 to +60 °C −40 to 140 °F		P.54
FT-KV26	135 5.315	560 22.047	Narrow Beam, Side-view, −40 to +60 °C −40 to 140 °F	✂ 2 m 6.562 ft	P.54
FT-KV40	2,200 86.614	3,600 141.732 (Note 2)	Narrow Beam, Side-view, −40 to +60 °C −40 to 140 °F		P.54
FT-KV40W	2,200 86.614	3,600 141.732 (Note 2)	Narrow Beam, Side-view, −40 to +60 °C −40 to 140 °F	✂ 2 m 6.562 ft	P.54
FT-L80Y	1,100 43.307	2,600 102.362	Chemical-resistant, Metal-free, −40 to +70 °C −40 to 158 °F	✂ 2 m 6.562 ft (Note 3)	P.54
FT-R31	100 3.937	340 13.386	Square head, M3, −55 to +80 °C −67 to 176 °F		P.54
FT-R40	270 10.630	740 29.134	Threaded, M4, Elbow, −55 to +80 °C −67 to 176 °F		P.54
FT-R41W	250 9.843	710 27.953	Square head, M4, −40 to +60 °C −40 to 140 °F		P.54
FT-R42W	510 20.079	2,000 78.740	Square head, M4, −40 to +60 °C −40 to 140 °F	✂ 2 m 6.562 ft	P.54
FT-R43	210 8.268	640 25.197	Square head, M4, −55 to +80 °C −67 to 176 °F		P.54
FT-R44Y	210 8.268	640 25.197	Oil-resistant, Square head, M4, Cable-protection type, −55 to +80 °C −67 to 176 °F		P.55
FT-R60Y	690 27.165	1,890 74.409	Oil-resistant, Square head, M6, Full-protection type, −55 to +80 °C −67 to 176 °F		P.55
FT-S11	40 1.575	90 3.543	Cylindrical, ϕ1 0.039, −55 to +80 °C −67 to 176 °F	500 mm 19.685 in	P.55
FT-S20	135 5.315	400 15.748	Super quality, Cylindrical, ϕ1.5 0.059, −55 to +80 °C −67 to 176 °F	2 m 6.562 ft	P.55
FT-S21	130 5.118	340 13.386	Cylindrical, ϕ1.5 0.059, −55 to +80 °C −67 to 176 °F	✂ 2 m 6.562 ft	P.55
FT-S21W	80 3.150	240 9.449	Cylindrical, ϕ1.5 0.059, −40 to +60 °C −40 to 140 °F		P.55
FT-S30	320 12.598	870 34.252	Super quality, Cylindrical, ϕ3 0.118, −55 to +80 °C −67 to 176 °F	2 m 6.562 ft	P.55
FT-S31W	260 10.236	720 28.346	Cylindrical, ϕ3 0.118, −40 to +60 °C −40 to 140 °F		P.55
FT-S32	1,100 43.307	3,000 118.110	Cylindrical, ϕ2.5 0.098, −40 to +70 °C −40 to 158 °F		P.55
FT-V23	160 6.299	400 15.748	Sleeve, Cylindrical, Side-view, ϕ2 0.079, −55 to +80 °C −67 to 176 °F		P.55
FT-V24W	35 1.378	90 3.543	Sleeve, Cylindrical, Side-view, ϕ2 0.079, −40 to +60 °C −40 to 140 °F	✂ 2 m 6.562 ft	P.56
FT-V25	95 3.740	260 10.236	Sleeve, Cylindrical, Side-view, ϕ2 0.079, −55 to +80 °C −67 to 176 °F		P.56
FT-V30	180 7.087	480 18.898	Sleeve, Cylindrical, Side-view, ϕ2.5 0.098, −55 to +80 °C −67 to 176 °F		P.56
FT-V40	1,000 39.370	3,100 122.047	Cylindrical, Side-view, ϕ4 0.157, −40 to +60 °C −40 to 140 °F		P.56
FT-V80Y	340 13.386	800 31.496	Chemical-resistant, Metal-free −40 to +70 °C −40 to 158 °F	✂ 2 m 6.562 ft (Note 3)	P.56
FT-Z20HBW	100 3.937	320 12.598	Flat with boss, −40 to +60 °C −40 to 140 °F	✂ 1 m 3.281 ft	P.56
FT-Z20W	280 11.024	730 28.740	Flat with boss, −40 to +60 °C −40 to 140 °F		P.56
FT-Z30	710 27.953	2,300 90.551	Flat, −40 to +60 °C −40 to 140 °F		P.56
FT-Z30E	1,200 47.244	3,200 125.984	Flat, −40 to +60 °C −40 to 140 °F		P.56
FT-Z30EW	1,400 55.118	2,600 102.362	Flat, −40 to +60 °C −40 to 140 °F		P.57
FT-Z30H	1,400 55.118	3,200 125.984	Flat, −40 to +60 °C −40 to 140 °F		P.57
FT-Z30HW	1,400 55.118	3,200 125.984	Flat, −40 to +60 °C −40 to 140 °F	✂ 2 m 6.562 ft	P.57
FT-Z30W	540 21.260	1,800 70.866	Flat, −40 to +60 °C −40 to 140 °F		P.57
FT-Z40HBW	260 10.236	720 28.346	Flat with boss, −40 to +60 °C −40 to 140 °F		P.57
FT-Z40W	410 16.142	1,200 47.244	Flat with boss, −40 to +60 °C −40 to 140 °F		P.57
FT-Z802Y	520 20.472	3,100 122.047	Chemical-resistant, 0 to +60 °C 32 to 140 °F		P.57

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.

LIST OF FIBERS

Retroreflective type



Fibers are listed in alphabetic order. Refer to p.5~ “Fiber Selection” for details of each fiber.

Model No.	Sensing range (mm in) (Note 1) (Note 2)		Type / Ambient temperature	Fiber cable length ✂: Free-cut	Dimensions
	Standard type **FX-101□**	Long sensing range type **FX-102□**			
FR-KZ22E	15 to 200 0.591 to 7.874	15 to 360 0.591 to 14.173	Wafer mapping, −40 to +60 °C −40 to 140 °F	✂ 2 m 6.562 ft	P.58
FR-KZ50E	20 to 200 0.787 to 7.874	20 to 350 0.787 to 13.780	Narrow Beam, Side sensing, −40 to +60 °C −40 to 140 °F		P.58
FR-KZ50H	20 to 200 0.787 to 7.874	20 to 350 0.787 to 13.780	Narrow Beam, Top sensing, −40 to +60 °C −40 to 140 °F		P.58
FR-Z50HW	100 to 550 3.937 to 21.654	100 to 830 3.937 to 32.677	With polarizing filter, −25 to +55 °C −13 to 131 °F		P.58

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.
The sensing range of **FR-KZ22E** is specified for the attached reflector. The sensing range of **FR-KZ50E** and **FR-KZ50H** is specified for the attached reflector **RF-003**. The sensing range of **FR-Z50HW** is specified for the **RF-13**.
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. 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.

Reflective type

Fibers are listed in alphabetic order. Refer to p.5~ “Fiber Selection” for details of each fiber.

Model No.	Sensing range (mm in) (Note 1) (Note 2) / Description		Type / Ambient temperature	Fiber cable length ✂: Free-cut	Dimensions
	Standard type **FX-101□**	Long sensing range type **FX-102□**			
FD-30	45 1.772	155 6.102	Super quality, Threaded, M3, −55 to +80 °C −67 to 176 °F	2 m 6.562 ft	P.59
FD-31	35 1.378	140 5.512	Threaded, M3, −55 to +80 °C −67 to 176 °F	✂ 2 m 6.562 ft	P.59
FD-31W	15 0.591	60 2.362	Threaded, M3, −40 to +60 °C −40 to 140 °F		P.59
FD-32G	70 2.756	190 7.480	Threaded, M3, −55 to +80 °C −67 to 176 °F		P.59
FD-32GX	75 2.953	210 8.268	Threaded, M3, −55 to +80 °C −67 to 176 °F	✂ 1 m 3.281 ft (Note 3)	P.59
FD-40	45 1.772	155 6.102	Super quality, Threaded, M4, −55 to +80 °C −67 to 176 °F	2 m 6.562 ft	P.59
FD-41	35 1.378	140 5.512	Threaded, M4, −55 to +80 °C −67 to 176 °F	✂ 2 m 6.562 ft	P.59
FD-41S	35 1.378	140 5.512	Sleeve, Threaded, M4, −55 to +80 °C −67 to 176 °F		P.59
FD-41SW	15 0.591	60 2.362	Sleeve, Threaded, M4, −40 to +60 °C −40 to 140 °F		P.59
FD-41W	80 3.150	230 9.055	Threaded, M4, −40 to +60 °C −40 to 140 °F		P.59
FD-42G	70 2.756	190 7.480	Threaded, M4, −55 to +80 °C −67 to 176 °F		P.60
FD-42GW	45 1.772	140 5.512	Threaded, M4, −40 to +60 °C −40 to 140 °F		P.60
FD-60	140 5.512	420 16.535	Super quality, Threaded, M6, −55 to +80 °C −67 to 176 °F	2 m 6.562 ft	P.60
FD-61	120 4.724	410 16.142	Threaded, M6, −55 to +80 °C −67 to 176 °F	✂ 2 m 6.562 ft	P.60
FD-61G	120 4.724	350 13.780	Threaded, M6, −55 to +80 °C −67 to 176 °F		P.60
FD-61S	130 5.118	360 14.173	Sleeve, Threaded, M6, −55 to +80 °C −67 to 176 °F		P.60
FD-61W	80 3.150	230 9.055	Threaded, M6, −40 to +60 °C −40 to 140 °F		P.60
FD-62	170 6.693	450 17.717	Threaded, M6, −55 to +80 °C −67 to 176 °F		P.60
FD-64X	75 2.953	220 8.661	Threaded, M6, −55 to +80 °C −67 to 176 °F	1 m 3.281 ft	P.61
FD-A16	120 4.724	240 9.449	Wide beam, −40 to +60 °C −40 to 140 °F	✂ 2 m 6.562 ft	P.61
FD-AL11	100 3.937	285 11.220	Array, −55 to +80 °C −67 to 176 °F		P.61
FD-E13	5 0.197	15 0.591	Cylindrical, Ultra-small dia., ø1.5 0.059, −40 to +60 °C −40 to 140 °F	1 m 3.281 ft	P.61
FD-E23	20 0.787	70 2.756	Cylindrical, Ultra-small dia., ø3 0.118, −40 to +70 °C −40 to 158 °F		P.61
FD-EG30	20 0.787	70 2.756	Threaded, M3, Ultra-small dia., −40 to +70 °C −40 to 158 °F	500 mm 19.685 in	P.61
FD-EG30S	20 0.787	70 2.756	Sleeve, Threaded, Ultra-small dia., M3, −40 to +70 °C −40 to 158 °F	1 m 3.281 ft	P.62
FD-EG31	7 0.276	25 0.984	Threaded, M3, Ultra-small dia., −20 to +60 °C −4 to 140 °F	500 mm 19.685 in	P.62
FD-F4	Applicable pipe diameter: Outer dia. ø6 to ø26 mm ø0.236 to ø1.024 in transparent pipe [PFA (fluorine resin) or equivalently transparent pipe, wall thickness 1 mm 0.039 in] Liquid absent: Beam received, Liquid present: Beam interrupted		Pipe-mountable type, Liquid level sensing, −40 to +100 °C −40 to 212 °F	✂ 2 m 6.562 ft	P.62
FD-F41	Applicable pipe diameter: Outer dia. ø6 to ø26 mm ø0.236 to ø1.024 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 interrupted		Pipe-mountable type, Liquid level sensing, −40 to +100 °C −40 to 212 °F		P.62

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 500 mm 19.685 in from the end that the amplifier inserted.

LIST OF FIBERS

Reflective type

Fibers are listed in alphabetic order. Refer to p.5~ “Fiber Selection” for details of each fiber.

Model No.	Sensing range (mm in) (Note 1) (Note 2) / Description		Type / Ambient temperature	Fiber cable length ✂: Free-cut	Dimensions
	Standard type **FX-101**□	Long sensing range type **FX-102**□			
FD-F41Y (Note 3)	ø4 mm ø0.157 in Protective tube: Fluorine resin, length 500 mm 19.685 in (cuttable) Liquid surface not contacted: Beam received, Liquid surface contacted: Beam interrupted		Contact type, Liquid level sensing, Metal-free, −40 to +70 °C −40 to 158 °F	✂ 2 m 6.562 ft	P.62
FD-F8Y	ø6 mm ø0.236 in Protective tube: Fluorine resin, length 1,000 mm 39.370 in (not cuttable) Liquid surface not contacted: Beam received, Liquid surface contacted: Beam interrupted		Contact type, Liquid level sensing, −40 to +125 °C −40 to 257 °F	✂ 2 m 6.562 ft (Note 6)	P.62
FD-FA93	Applicable pipe diameter: Outer dia. ø8 mm ø0.315 in or more transparent pipe (When used with the tying bands: ø8 to ø80 mm ø0.315 to ø3.150 in) [PFA (fluorine resin), including translucent] Liquid absent: Beam received, Liquid present: Beam interrupted		Pipe-mountable type, Liquid sensing, −40 to +70 °C −40 to 158 °F	✂ 2 m 6.562 ft	P.62
FD-H13-FM2	100 3.937	280 11.024	Heat-resistant, Threaded, −60 to +130 °C −76 to 266 °F		P.63
FD-H18-L31	0 to 10 0 to 0.394	0 to 25 0 to 0.984	Heat-resistant, Glass substrate detection convergent reflective, −60 to +180 °C −76 to 356 °F		P.63
FD-H20-21	90 3.543	280 11.024	Heat-resistant, Threaded, −60 to +200 °C −76 to 392 °F	1 m 3.281 ft	P.63
FD-H20-M1	120 4.724	300 11.811	Heat-resistant, Threaded, −60 to +200 °C −76 to 392 °F		P.63
FD-H25-L43 (Note 4)	4 to 16 0.157 to 0.630	4 to 23 0.157 to 0.906	Heat-resistant, Glass substrate detection convergent reflective, −20 to +250 °C −4 to 482 °F (Ordinary temp. side:-20 to +70 °C −4 to 158 °F)	3 m 9.843 ft	P.63
FD-H25-L45 (Note 4)	7 to 35 0.276 to 1.378	7 to 38 0.276 to 1.496	Heat-resistant, Glass substrate detection convergent reflective, −20 to +250 °C −4 to 482 °F (Ordinary temp. side:-20 to +70 °C −4 to 158 °F)		P.63
FD-H30-KZ1V-S (Note 4, 5)	25 to 80 0.984 to 3.150	10 to 220 0.394 to 8.661	Vacuum-resistant, Reflective, −30 to +300 °C −22 to 572 °F	1 m 3.281 ft	P.64
FD-H30-L32	2 to 9 0.079 to 0.354	0 to 17 0 to 0.669	Heat-resistant, Glass substrate detection convergent reflective, −60 to +300 °C −76 to 572 °F	2 m 6.562 ft	P.64
FD-H30-L32V-S (Note 4, 5)	2.5 to 6.5 0.098 to 0.256	0 to11 0 to 0.433	Vacuum-resistant, Convergent reflective, −30 to +300 °C −22 to 572 °F	3 m 9.843 ft	P.64
FD-H35-20S	85 3.346	200 7.874	Heat-resistant, Threaded, −60 to +350 °C −76 to 662 °F	1 m 3.281 ft	P.64
FD-H35-M2	75 2.953	280 11.024	Heat-resistant, Threaded, −60 to +350 °C −76 to 662 °F	2 m 6.562 ft	P.64
FD-H35-M2S6	75 2.953	280 11.024	Heat-resistant, Threaded, −60 to +350 °C −76 to 662 °F		P.64
FD-HF40Y (Note 3)	ø4 mm ø0.157 in Protective tube: Fluorine resin, length 500 mm 19.685 in (cuttable) Liquid surface not contacted: Beam received, Liquid surface contacted: Beam not received		Contact type, Liquid level sensing, Metal-free, −40 to +105 °C −40 to 221 °F	✂ 2 m 6.562 ft	P.64
FD-L10 (Note 4)	0 to 4.5 0 to 0.177	0 to 5.5 0 to 0.217	Glass substrate detection, −40 to +60 °C −40 to 140 °F		P.65
FD-L11 (Note 4)	0 to 8 0 to 0.315	0 to 9 0 to 0.354	Glass substrate detection, −40 to +60 °C −40 to 140 °F		P.65
FD-L12W (Note 4)	1 to 4.5 0.039 to 0.177	0.5 to 7 0.020 to 0.276	Ultla-small, −40 to +60 °C −40 to 140 °F	✂ 1 m 3.281 ft	P.65
FD-L20H	5 to 15 0.197 to 0.591	1 to 30 0.039 to 1.181	General purpose, −40 to +70 °C −40 to 158 °F	✂ 2 m 6.562 ft	P.65
FD-L21 (Note 4)	3 to 15 0.118 to 0.591	1.5 to 16 0.059 to 0.630	Glass substrate detection, −40 to +60 °C −40 to 140 °F		P.65
FD-L21W (Note 4)	7 to 12 0.276 to 0.472	3 to 14 0.118 to 0.551	Glass substrate detection, −40 to +60 °C −40 to 140 °F		P.65
FD-L22A (Note 4)	0 to 19 0 to 0.748	0 to 25 0 to 0.984	Glass substrate detection, 0 to +70 °C 32 to 158 °F		P.65
FD-L23 (Note 4)	0 to 28 0 to 1.102	0 to 30 0 to 1.181	Glass substrate detection, −20 to +70 °C −4 to 158 °F	✂ 3 m 9.843 ft	P.65
FD-L30A (Note 4)	0 to 40 0 to 1.575	0 to 50 0 to 1.969	Glass substrate detection, 0 to +70 °C 32 to 158 °F		P.65
FD-L31A (Note 4)	5 to 30 0.197 to 1.181	4 to 33 0.157 to 1.299	Glass substrate detection, 0 to +70 °C 32 to 158 °F		P.65
FD-L32H (Note 4)	16 to 30 0.630 to 1.181	0 to 50 0 to 1.969	Glass substrate detection, −40 to +60 °C −40 to 140 °F	✂ 4 m 13.123 ft	P.66

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 of reflective type is the value for white non-glossy paper (as for **FD-H30-L32** and **FD-H18-L31** 50 × 50 mm 1.969 × 1.969 in glass substrate).
3) Liquid inflow prevention joint, protective tube extension joint, fiber mounting joint are available. Please refer to p.38 for details.
4) The sensing range is specified for transparent glass 100 × 100 × t0.7 mm 3.937 × 3.937 × t0.028 in (**FD-L32H**: R edge, **FD-L21** and **FD-L21W**: t2 mm t0.079 in) [**FD-L10**: silicon wafers 100 × 100 mm 3.937 × 3.937 in].
5) Sold as a set comprising vacuum type fiber + photo-terminal (**FV-BR1**) + fiber at atmospheric side (**FT-J8**).
6) The allowable cutting range is 1,000 mm 39.370 in from the end that is inserted to the amplifier.

LIST OF FIBERS

Reflective type

Fibers are listed in alphabetic order. Refer to p.5~ “Fiber Selection” for details of each fiber.

Model No.	Sensing range (mm in) (Note 1) (Note 2)		Type / Ambient temperature	Fiber cable length ✂: Free-cut	Dimensions
	Standard type **FX-101□**	Long sensing range type **FX-102□**			
FD-R31G	45 1.772	150 5.906	Square head, M3, −55 to +80 °C −67 to 176 °F	✂ 2 m 6.562 ft	P.66
FD-R32EG	20 0.787	68 2.677	Square head, M3, −40 to +70 °C −40 to 158 °F	500 mm 19.685 in	P.66
FD-R33EG	7 0.276	22 0.866	Square head, M3, −20 to +60 °C −4 to 140 °F		P.66
FD-R34EG	17 0.669	60 2.362	Square head, M3, −40 to +70 °C −40 to 158 °F		P.66
FD-R41	60 2.362	170 6.693	Square head, M4, −55 to +80 °C −67 to 176 °F	✂ 2 m 6.562 ft	P.66
FD-R60	110 4.331	240 9.449	Threaded, M6, Elbow, −55 to +80 °C −67 to 176 °F		P.66
FD-R61Y	85 3.346	185 7.283	Oil-resistant, Square head, M6, Cable-proection type, −55 to +80 °C −67 to 176 °F		P.66
FD-S21	25 0.984	70 2.756	Cylindrical, ø1.5 0.059, −55 to +80 °C −67 to 176 °F	1 m 3.281 ft	P.66
FD-S30	45 1.772	155 6.102	Super quality, Cylindrical, ø3 0.118, −55 to +80 °C −67 to 176 °F	2 m 6.562 ft	P.67
FD-S31	35 1.378	140 5.512	Cylindrical, ø3 0.118, −55 to +80 °C −67 to 176 °F	✂ 2 m 6.562 ft	P.67
FD-S32	120 4.724	345 13.583	Cylindrical, ø3 0.118, −55 to +80 °C −67 to 176 °F		P.67
FD-S32W	80 3.150	230 9.055	Cylindrical, ø3 0.118, −40 to +60 °C −40 to 140 °F		P.67
FD-S33GW	45 1.772	140 5.512	Cylindrical, ø3 0.118, −40 to +60 °C −40 to 140 °F		P.67
FD-S60Y	140 5.512	300 11.811	Chemical-resistant, Chlindrical, Metal-free, ø5.5 0.217, −40 to +70 °C −40 to 158 °F	✂ 2 m 6.562 ft (Note 3)	P.67
FD-V30	25 0.984	75 2.953	Sleeve, Cylindrical, Side-view, ø3 0.118, −55 to +80 °C −67 to 176 °F	✂ 2 m 6.562 ft	P.67
FD-V30W	6 0.236	20 0.787	Sleeve, Cylindrical, Side-view, ø3 0.118, −40 to +60 °C −40 to 140 °F		P.67
FD-V50	40 1.575	100 3.937	Sleeve, Cylindrical, Side-view, ø5 0.197, −55 to +80 °C −67 to 176 °F		P.68
FD-Z20HBW	2 to 30 0.079 to 1.181	1 to 90 0.039 to 3.543	Flat with boss, −40 to +60 °C −40 to 140 °F	✂ 1 m 3.281 ft	P.68
FD-Z20W	2 to 32 0.079 to 1.260	1 to 80 0.039 to 3.150	Flat with boss, −40 to +60 °C −40 to 140 °F		P.68
FD-Z40HBW	1 to 90 0.039 to 3.543	0.5 to 240 0.020 to 9.449	Flat with boss, −40 to +60 °C −40 to 140 °F	✂ 2 m 6.562 ft	P.68
FD-Z40W	1 to 74 0.039 to 2.913	200 7.874	Flat with boss, −40 to +60 °C −40 to 140 °F		P.68
FD-Z50HW	10 to 200 0.394 to 7.874	10 to 530 0.394 to 20.866	Narrow Beam, Long range, −40 to +60 °C −40 to 140 °F		P.68

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 500 mm 19.685 in from the end that the amplifier inserted.

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

Reflector Model No.	Sensing range (mm in)	
	Standard type **FX-101□**	Long sensing range type **FX-102□**
RF-230	100 to 2,400 3.937 to 94.488	100 to 5,000 3.937 to 196.850
RF-220	100 to 1,300 3.937 to 51.181	100 to 2,600 3.937 to 102.362
RF-210	100 to 980 3.937 to 38.583	100 to 1,300 3.937 to 51.181

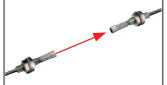
Note: The sensing range is the possible setting range for the reflector.
The fiber can detect an object less than 100 mm 3.937 in. However, note that if there are any white or highly-reflective surfaces near the fiber head, reflected incident light may affect the fiber head. If this occurs, adjust the threshold value of the amplifier unit before use.

FIBER OPTIONS

Refer to p.69~ for details of lens dimensions.

Lens (For thru-beam type fiber)

Expansion lens (Note 1) — FX-LE1



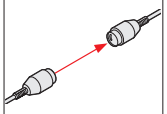
Increases the sensing range by 5 times or more.

- Ambient temperature: −60 to +350 °C −76 to +662 °F (Note 4)
- Beam dia: ø3.6 mm ø0.142 in

Sensing range (mm in) [Lens on both sides]

Mode / Fiber	FX-101□	FX-102□
FT-43	2,400 94.488	3,600 141.732 (Note 2)
FT-42 FT-42W	3,400 133.858	3,600 141.732 (Note 2)
FT-45X	1,600 62.992 (Note 2)	1,600 62.992 (Note 2)
FT-R40	3,100 122.047	3,600 141.732 (Note 2)
FT-R43	1,300 51.181	3,600 141.732 (Note 2)
FT-H35-M2	2,000 78.740	3,500 137.795 (Note 2)
FT-H20W-M1	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)
FT-H20-J50-S FT-H20-J30-S FT-H20-J20-S	1,000 39.370	3,500 137.795 (Note 2)

Super-expansion lens (Note 1) — FX-LE2



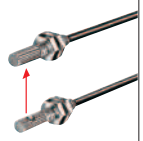
Tremendously increases the sensing range with large diameter lenses.

- Ambient temperature: −60 to +350 °C −76 to +662 °F (Note 4)
- Beam dia: ø9.8 mm ø0.386 in

Sensing range (mm in) [Lens on both sides]

Mode / Fiber	FX-101□	FX-102□
FT-43 FT-42 FT-42W	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)
FT-R40	3,600 141.732 (Note 2)	3,600 141.732 (Note 2)
FT-R43	3,600 141.732 (Note 2)	3,600 141.732 (Note 2)
FT-H35-M2	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)
FT-H13-FM2	3,500 137.795 (Note 2)	3,500 137.795 (Note 2)
FT-H20-J50-S FT-H20-J30-S FT-H20-J20-S	3,500 137.795 (Note 2)	3,500 137.795 (Note 2)

Side-view lens — FX-SV1



Beam axis is bent by 90°.

- Ambient temperature: −60 to +300 °C −76 to +572 °F (Note 4)
- Beam dia: ø2.8 mm ø0.110 in

Sensing range (mm in) [Lens on both sides]

Mode / Fiber	FX-101□	FX-102□
FT-43	510 20.079	1,400 55.118
FT-42	500 19.685	1,700 66.929
FT-42W	480 18.898	1,300 51.181
FT-45X	540 21.260	1,600 62.992 (Note 2)
FT-R43	310 12.205	930 36.614
FT-H35-M2	280 11.024	800 31.496
FT-H20W-M1	140 5.512	400 15.748
FT-H20-M1	280 11.024	840 33.071
FT-H20-J50-S FT-H20-J30-S FT-H20-J20-S	150 5.906	410 16.142

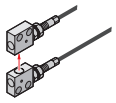
Expansion lens for vacuum fiber (Note 1) — FV-LE1

Sensing range increases by 4 times or more.
- Ambient temperature: −60 to +350 °C −76 to +662 °F (Note 4)
- Beam dia: ø3.6 mm ø0.142 in

Sensing range (mm in) [Lens on both sides] (Note 3)

Mode / Fiber	FX-101□	FX-102□
FT-H30-M1V-S	450 17.717	1,600 62.992

Vacuum-resistant side-view lens (Note 1) — FV-SV2



Beam axis is bent by 90°.
- Ambient temperature: −60 to +300 °C −76 to +572 °F (Note 4)
- Beam dia: ø3.7 mm ø0.146 in

Sensing range (mm in) [Lens on both sides] (Note 3)

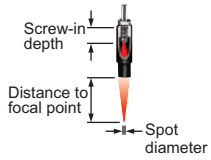
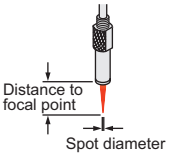
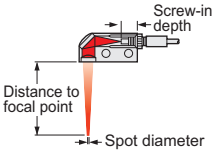
Mode / Fiber	FX-101□	FX-102□
FT-H30-M1V-S	450 17.717	1,600 62.992

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 **FX-102□** are specified considering the length of the **FT-J8** atmospheric side fiber.
4) Refer to "**LIST OF FIBERS** (p.124~)" for the ambient temperature of fibers to be used in combination.

FIBER OPTIONS

Refer to p.69~ for details of lens dimensions.

Lens (For reflective type fiber)

Designation		Model No.		Description
For reflective type fiber	Pinpoint spot lens	**FX-MR1**		Pinpoint spot of ø0.5 mm ø0.020 in. Enables detection of minute objects or small marks. • Distance to focal point: 6 ± 1 mm 0.236 ± 0.039 in • Applicable fibers: **FD-42G**, **FD-42GW** • Ambient temperature: −40 to +70 °C −40 to +158 °F (Note)
	Zoom lens	**FX-MR2**		The spot diameter is adjustable from ø0.7 to ø2 mm ø0.028 to ø0.079 in according to how much the fiber is screwed in. • Applicable fibers: **FD-42G**, **FD-42GW** • Ambient temperature: −40 to +70 °C −40 to +158 °F (Note) • Accessory: **MS-EX3** (mounting bracket)
	Finest spot lens	**FX-MR3**		Extremely fine spot of ø0.15 mm ø0.006 in approx. achieved. • 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)
	Finest spot lens	**FX-MR6**		Extremely fine spot of ø0.1 mm ø0.004 in approx. achieved. • 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)
	Zoom lens (side-view type)	**FX-MR5**		**FX-MR2** is converted into a side-view type and can be mounted in a very small space. • Applicable fibers: **FD-42G**, **FD-42GW** • Ambient temperature: −40 to +70 °C −40 to +158 °F (Note)

Sensing range for FX-100 series

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

Sensing range for FX-100 series

Fiber model No.	Distance to focal point	Spot diameter
FD-EG31	7.5 ±0.5 mm 0.295 ±0.020 in	ø0.15 mm ø0.006 in approx.
FD-EG30	7.5 ±0.5 mm 0.295 ±0.020 in	ø0.3 mm ø0.012 in approx.
FD-42G/42GW FD-32G/32GX	7.5 ±0.5 mm 0.295 ±0.020 in	ø0.5 mm ø0.020 in approx.

Sensing range for FX-100 series

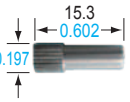
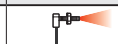
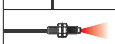
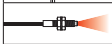
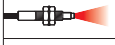
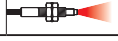
Fiber model No.	Distance to focal point	Spot diameter
FD-EG31	7 ±0.5 mm 0.276 in ±0.020 in	ø0.1 mm ø0.004 in approx.
FD-EG30	7 ±0.5 mm 0.276 in ±0.020 in	ø0.2 mm ø0.008 in approx.
FD-42G/42GW FD-32G/32GX	7 ±0.5 mm 0.276 in ±0.020 in	ø0.4 mm ø0.016 in approx.

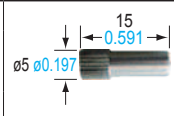
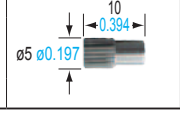
Sensing range for FX-100 series

Fiber model No.	Distance to focal point	Spot diameter
8 mm 0.315 in	13 mm 0.512 in approx.	ø0.5 mm ø0.020 in
10 mm 0.394 in	15 mm 0.591 in approx.	ø0.8 mm ø0.031 in
14 mm 0.551 in	30 mm 1.181 in approx.	ø3.0 mm ø0.118 in

Note: Refer to p.126 for the ambient temperature of fibers to be used in combination.

Lens (For square head M3 reflective fiber)

Type		Spot diameter (mm in)(Note)	Distance to focal point (mm in)(Note)	Lens Shape (mm in)	Lens Model No.	Fiber Shape	Fiber Emitting fiber core (mm in)	Fiber Model No.
For Square head M3 reflective fiber	Finest spot lens	ø0.1 ø0.004 approx.	7 ± 0.5 0.276 ± 0.020		**FX-MR7**		ø0.125 ø0.005	**FD-R33EG**
							ø0.125 ø0.005	**FD-EG31**
		ø0.15 ø0.006 approx.					ø0.175 ø0.007	**FD-R34EG**
		ø0.2 ø0.008 approx.					ø0.25 ø0.010	**FD-R32EG**
							ø0.25 ø0.010	**FD-EG30**
		ø0.4 ø0.016 approx.					ø0.5 ø0.020	**FD-R31G**
							ø0.5 ø0.020	**FD-32G**
							ø0.5 ø0.020	**FD-32GX**
							ø0.5 ø0.020	**FD-42G**
							ø0.5 ø0.020	**FD-42GW**

Type		Spot diameter (mm in)(Note)	Sensing range (mm in)(Note)	Lens Shape (mm in)	Lens Model No.	Applicable fibers Emitting fiber core (mm in)	Applicable fibers Model No.
For Square head M3 reflective fiber	Zoom lens	ø0.4 to ø2.0 ø0.016 to ø0.079 approx.	10 to 30 0.394 to1.181		**FX-MR8**	ø0.125 ø0.005	**FD-R33EG, FD-EG31**
		ø0.4 to ø2.2 ø0.016 to ø0.087 approx.				ø0.175 ø0.007	**FD-R34EG**
		ø0.5 to ø2.5 ø0.020 to ø0.098 approx.				ø0.25 ø0.010	**FD-R32EG, FD-EG30**
		ø0.8 to ø3.5 ø0.031 to ø0.138 approx.				ø0.5 ø0.020	**FD-R31G, FD-32G, FD-32GX, FD-42G, FD-42GW**
	Parallel light lens	ø4.0 ø0.157 approx.	0 to 30 0 to 1.181		**FX-MR9**	ø0.125 ø0.005	**FD-R33EG, FD-EG31**
						ø0.175 ø0.007	**FD-R34EG**
						ø0.25 ø0.010	**FD-R32EG, FD-EG30**
						ø0.5 ø0.020	**FD-R31G, FD-32G, FD-32GX, FD-42G, FD-42GW**

Note: Spot diameter, distance to focal point and sensing range are specified for **FX-100** series.

SPECIFICATIONS

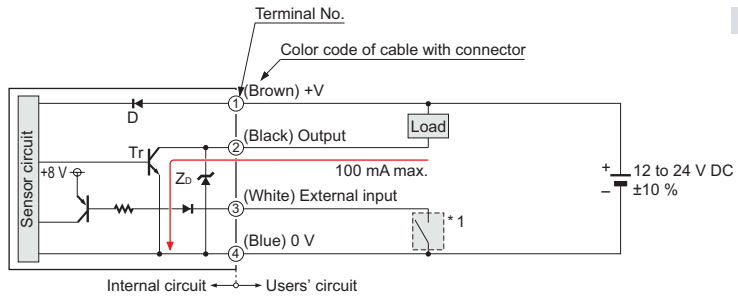
Item \ Type		Standard type		Long sensing range type	
			Cable set		Cable set
Model No.	NPN output	**FX-101**(**-Z**) (Note 5)	**FX-101-CC2**	**FX-102**(**-Z**) (Note 5)	**FX-102-CC2**
	PNP output	**FX-101P**(**-Z**) (Note 5)	**FX-101P-CC2**	**FX-102P**(**-Z**) (Note 5)	**FX-102P-CC2**
Supply voltage		12 to 24 V DC ±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 • 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 • 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 • 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 • 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 µs or less (factory default setting) Emission frequency 1: 450 µs or less Emission frequency 2: 500 µs or less Emission frequency 3: 600 µs 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]			
Emission amount setting function		3-level + Auto setting (from production in December 2007)			
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 MΩ, 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/s² acceleration (10 G approx.) in X, Y and Z directions for five times each			
Emitting element (modulated)		Red LED (Peak emission wavelength: 643 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 mm², 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 production in July, 2011.

I/O CIRCUIT AND WIRING DIAGRAMS

FX-10□(-Z/-CC2) NPN output type

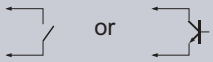
I/O circuit diagram



Symbols … D : Reverse supply polarity protection diode
ZD: Surge absorption zener diode
Tr : NPN output transistor

* 1

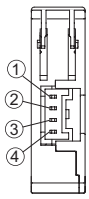
Non-voltage contact or NPN open-collector transistor



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

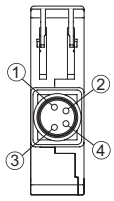
Terminal arrangement diagram

Connector type



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

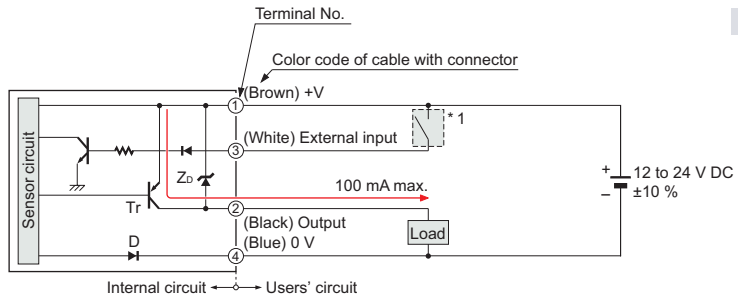
M8 plug-in connector type



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

FX-10□P(-Z/-CC2) PNP output type

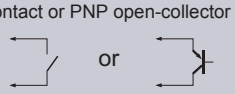
I/O circuit diagram



Symbols … D : Reverse supply polarity protection diode
ZD: Surge absorption zener diode
Tr : PNP output transistor

* 1

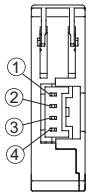
Non-voltage contact or PNP open-collector transistor



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

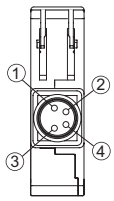
Terminal arrangement diagram

Connector type



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

M8 plug-in connector type

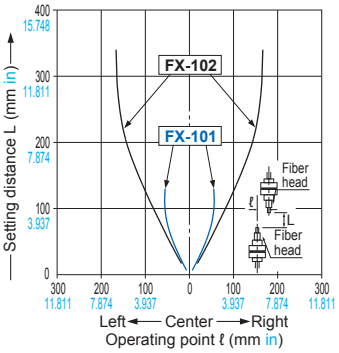


Terminal No.	Function
①	+V
②	Output
③	External input
④	0 V

SENSING CHARACTERISTICS (TYPICAL)

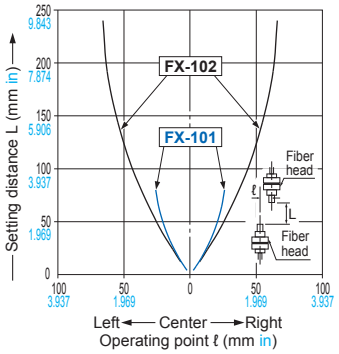
FT-31S — Thru-beam type

Parallel deviation



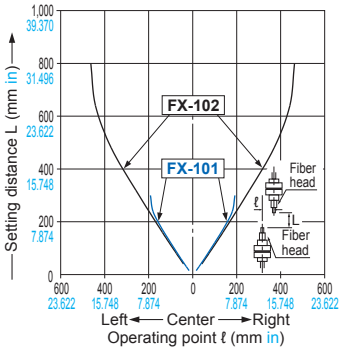
FT-31W — Thru-beam type

Parallel deviation



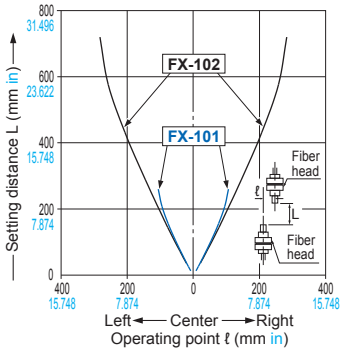
FT-42S — Thru-beam type

Parallel deviation



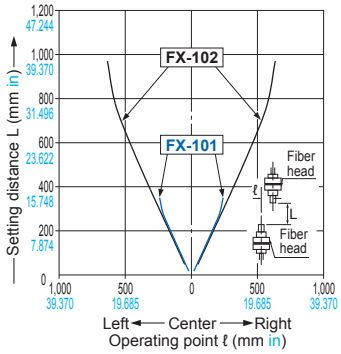
FT-42W — Thru-beam type

Parallel deviation



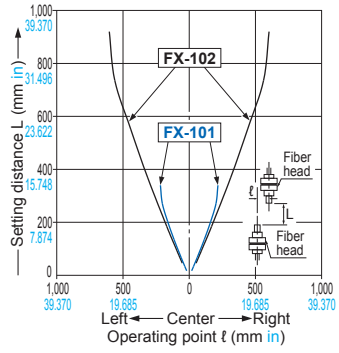
FT-43 — Thru-beam type

Parallel deviation



FT-45X — Thru-beam type

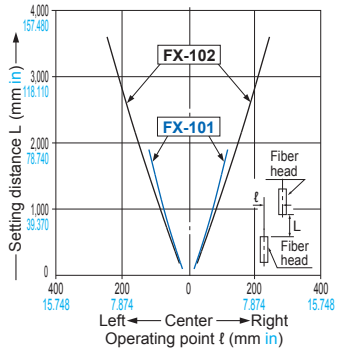
Parallel deviation



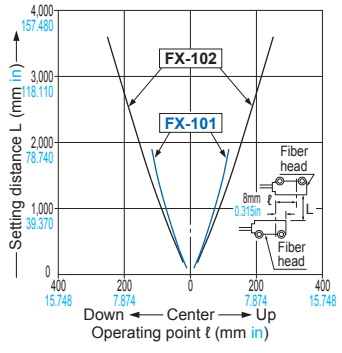
FT-A11 — Thru-beam type

Parallel deviation

- Horizontal direction

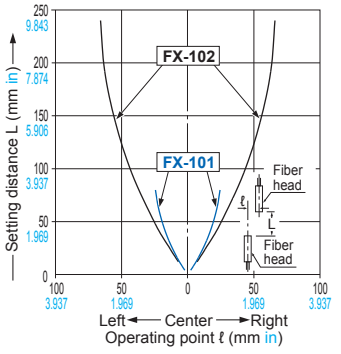


- Vertical direction



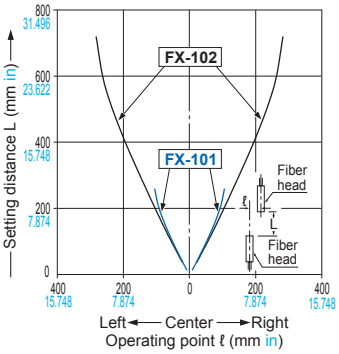
FT-S21W — Thru-beam type

Parallel deviation



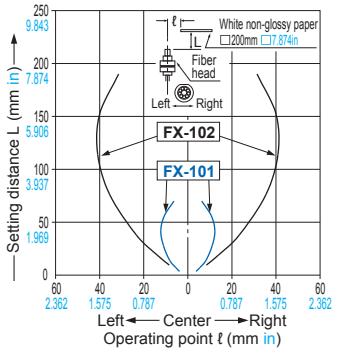
FT-S31W — Thru-beam type

Parallel deviation



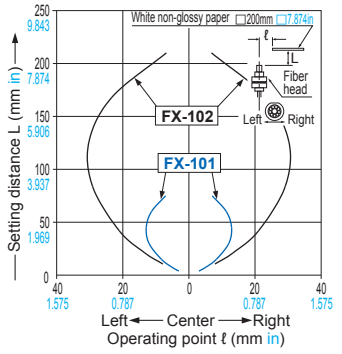
FD-32G — Reflective type

Sensing field



FD-32GX — Reflective type

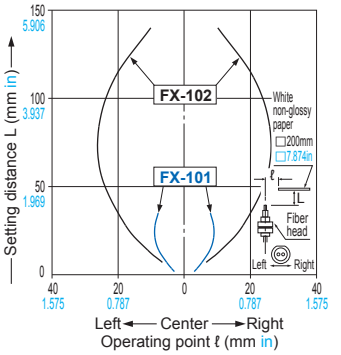
Sensing field



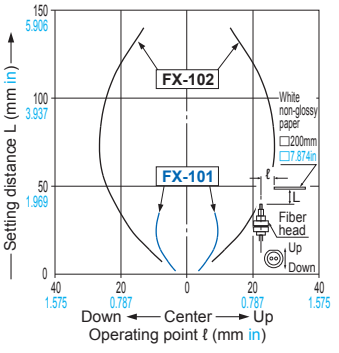
FD-41S — Reflective type

Sensing field

- Horizontal direction



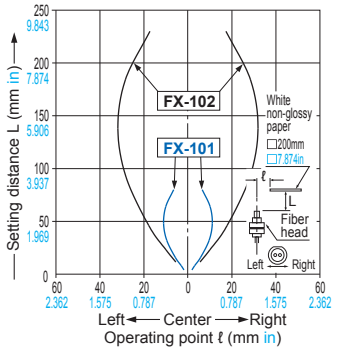
- Vertical direction



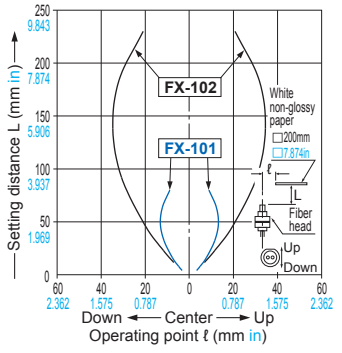
FD-41W — Reflective type

Sensing field

- Horizontal direction



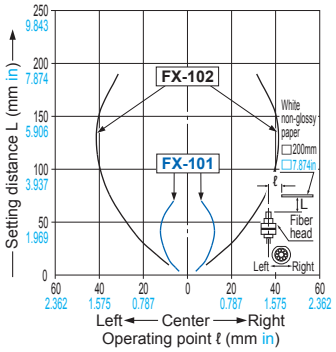
- Vertical direction



SENSING CHARACTERISTICS (TYPICAL)

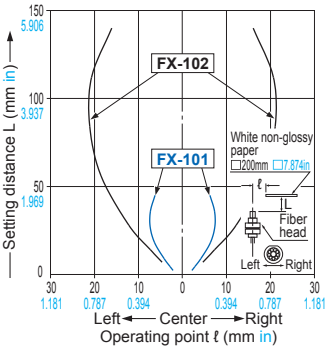
FD-42G Reflective type

Sensing field



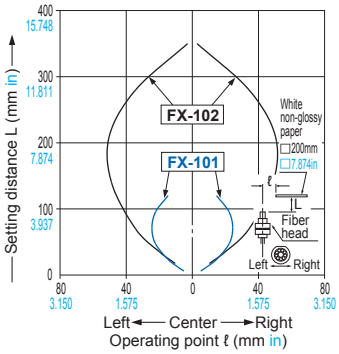
FD-42GW Reflective type

Sensing field



FD-61G Reflective type

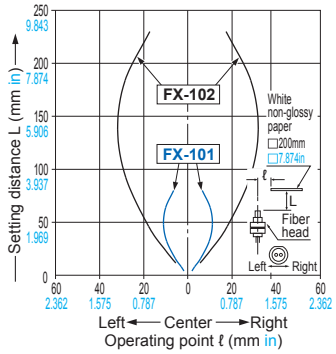
Sensing field



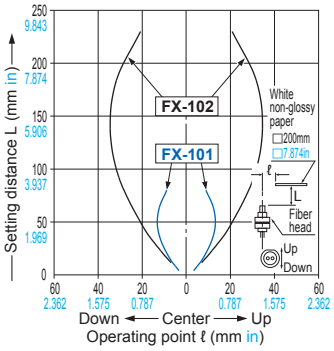
FD-61W Reflective type

Sensing field

• Horizontal direction



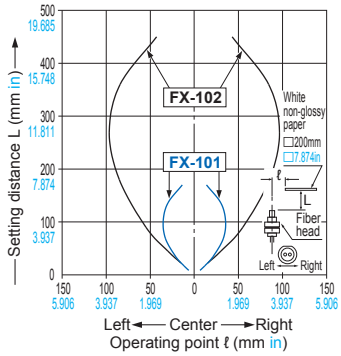
• Vertical direction



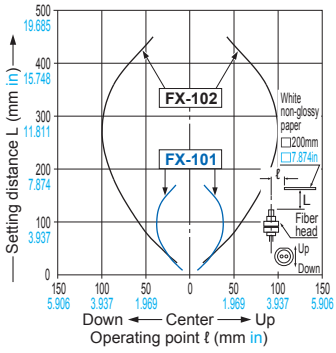
FD-62 Reflective type

Sensing field

• Horizontal direction



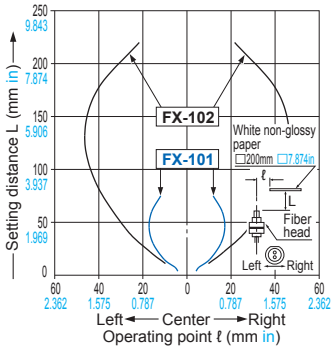
• Vertical direction



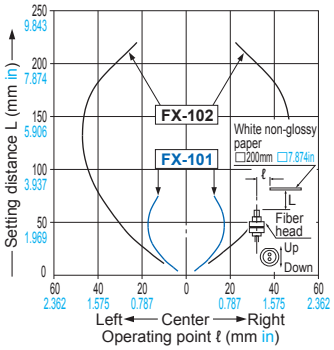
FD-64X Reflective type

Sensing field

• Horizontal direction



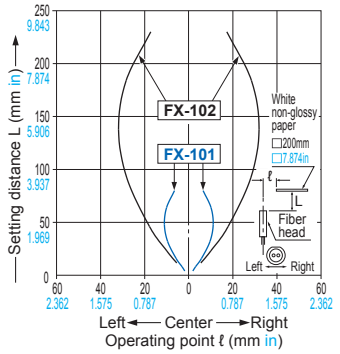
• Vertical direction



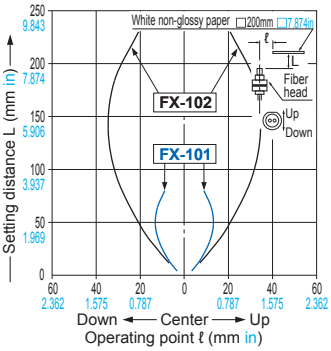
FD-S32W Reflective type

Sensing field

• Horizontal direction

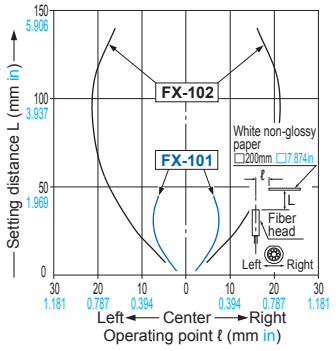


• Vertical direction



FD-S33GW Reflective type

Sensing field



PRECAUTIONS FOR PROPER USE

Refer to General precautions, and to the “Operation Guide” on our website for details pertaining to operating instructions for the amplifier.

- 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

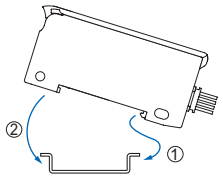
- The **FX-100** series does not use the horizontal connectors that are used with the **FX-300** / **FX-410** series. Please note that horizontal connection cannot be performed using a connector attached cable. In addition, the optical communication function is not equipped on the **FX-100** series, 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

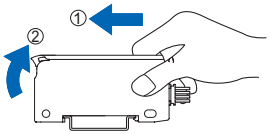
① Fit the rear part of the mounting section of the amplifier on a 35 mm 1.378 in width DIN rail.
② Press down the rear part of the mounting section of the unit on the 35 mm 1.378 in width DIN rail and fit the front part of the mounting section to the DIN rail.



35 mm 1.378 in width DIN rail

How to remove the amplifier

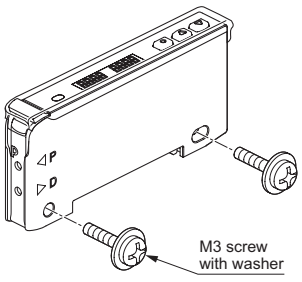
① Push the amplifier forward.
② Lift up the front part of the amplifier to remove it.



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>

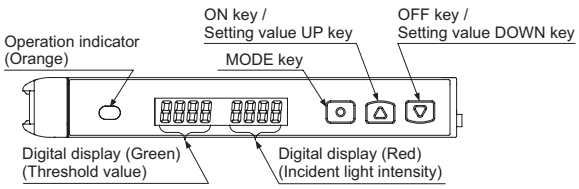
- Use M3 screws with washers for mounting. The tightening torque should be 0.5 N·m or less.



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.

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	tAch	Threshold value can be set in 2-point teaching, limit teaching, or full-auto teaching.
Output operation setting	L_d d_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 delays setting	ond 10 [ON-delay timer: 10 ms] oFd 10 [OFF-delay timer: 10 ms]	When setting ON delay timer or OFF delay timer in the timer operation setting mode, timer delays can be set. • When timer is not set, this mode is not displayed.
Emission amount setting	PctL 11111 * [Level 3]	In case incident light intensity is saturated, emission amount can be reduced.
Emission frequency setting	**FX-101□** FrE9 F-0 [0 (Response time: 250 µs or less)] **FX-102□** FrE9 F-01 [1 (Response time: 2.5 ms or less)]	When 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.

* Indicated as “ PctL oFF ” before production in November 2007.

PRECAUTIONS FOR PROPER USE

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

PRO mode

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

Setting item	Factory setting	Description
Shift setting	SHFt 15P [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	inPt E-oF [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 "tESt", 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)	b-uP oFF [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)	CYCL oFF [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)	GEtA oFF [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	Eco oFF [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	turn oFF [OFF]	Digital display can be inverted.
Threshold value margin setting	ALrt oFF [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. GrEn : Green blinks. rEd : Red blinks. ALL : Red and green blink. in-t : 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	CoPY no [NO]	The settings of the master side amplifier can be copied to the slave side amplifier. For details, refer to "**Setting copy function**".
Reset	rSEt no [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-", "Auto" or "2-Pt" is set at the external input setting mode. (Incorporated from production in December 2007.)
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,) "HArd" 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. (Incorporated from production in December 2007.)

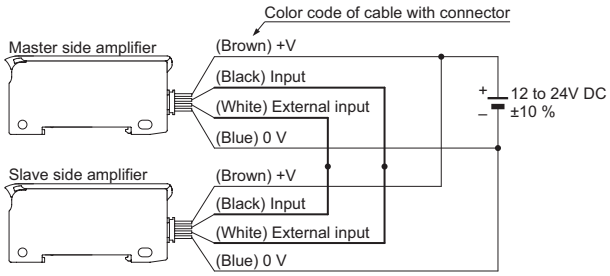
Setting copy function

• 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>

① Set the setting copy mode of the master side amplifier to "Copy sending ON", and press the MODE key so that "CoPY rEdY" is shown on the digital display and the sensor is in copy ready state. For the setting method, refer to "Operation guide".
② Turn off the master side amplifier.
③ Connect the master side amplifier with the slave side amplifier as shown below.



④ Turn on the master side amplifier and the slave side amplifier at the same time. (Note)
⑤ "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 ("1"→"11"→"111"→"1111"→"11111"→"111111"→"1111111") is displayed on the red digital display.
⑥ 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.
⑦ 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>

① While the slave side amplifier is disconnected, turn on the power of the master side amplifier.
② Press the MODE key for 2 sec. approx.

PRECAUTIONS FOR PROPER USE

Refer to General precautions, and to the “Operation Guide” on our website for details pertaining to operating instructions for the amplifier.

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>

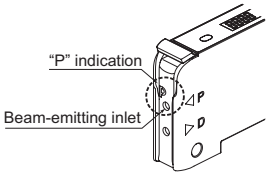
No.	Output operation	Timer	Emission amount setting (Note)
-00-	D-ON	non	Level 3 (OFF)
-01-	D-ON	non	Level 2 (ON)
-02-	D-ON	ofd 10 ms	Level 3 (OFF)
-03-	D-ON	ofd 10 ms	Level 2 (ON)
-04-	D-ON	ofd 40 ms	Level 3 (OFF)
-05-	D-ON	ofd 40 ms	Level 2 (ON)
-06-	D-ON	ond 10 ms	Level 3 (OFF)
-07-	D-ON	ond 10 ms	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)

Note: Until production in November 2007, OFF or ON was selectable. The emission amount of Level 2 (ON) is about 40% of that of Level 3 (OFF).

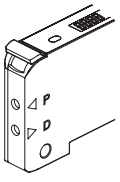
Difference between previous model and upgraded one

- For upgraded ones (production in and after December 2007), “P” is marked near the beam-emitting inlet. Previous ones have no marking. Appearance and functions have been changed.

<After upgrade>



<Previous>



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>

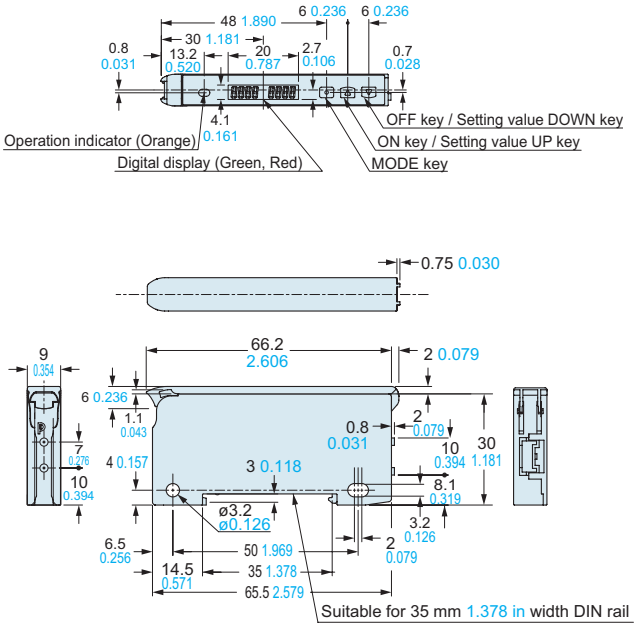
Code	1st digit		2nd digit			3rd digit		4th digit
	Output operation	Timer (Note 1)	Emission amount setting (Note 2)	Emission frequency FX-101□	Emission frequency FX-102□	ECO	External input	Shift (Note 1)
0	D-ON	non	Level 3 (OFF)	0	1	OFF	Emission halt	5 %
1	D-ON	ond 10 ms	Level 3 (OFF)	1	2	OFF	Limit teaching [+]	10 %
2	D-ON	ond 40 ms	Level 3 (OFF)	2	3	OFF	Limit teaching [-]	15 %
3	D-ON	ofd 10 ms	Level 3 (OFF)	3	4	OFF	Full-auto teaching	20 %
4	D-ON	ofd 40 ms	Level 2 (ON)	0	1	OFF	ECO	25 %
5	L-ON	non	Level 2 (ON)	1	2	ON	Emission halt	30 %
6	L-ON	ond 10 ms	Level 2 (ON)	2	3	ON	Limit teaching [+]	35 %
7	L-ON	ond 40 ms	Level 2 (ON)	3	4	ON	Limit teaching [-]	40 %
8	L-ON	ofd 10 ms	Level 1	0	1	ON	Full-auto teaching	45 %
9	L-ON	ofd 40 ms	Level 1	1	2	ON	ECO	50 %
A			Level 1	2	3	OFF	2-point teaching	
b			Level 1	3	4	OFF	Incident light intensity test	
C			Auto	0	1	ON	2-point teaching	
d			Auto	1	2	ON	Incident light intensity test	
E			Auto	2	3			
F			Auto	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) Until production in November 2007, OFF or ON was selectable. The emission amount of Level 2 is about 40% of that of Level 3. The emission amount of Level 1 is about 20% of that of Level 3.
3) The factory setting is “0002”.

DIMENSIONS (Unit: mm in)

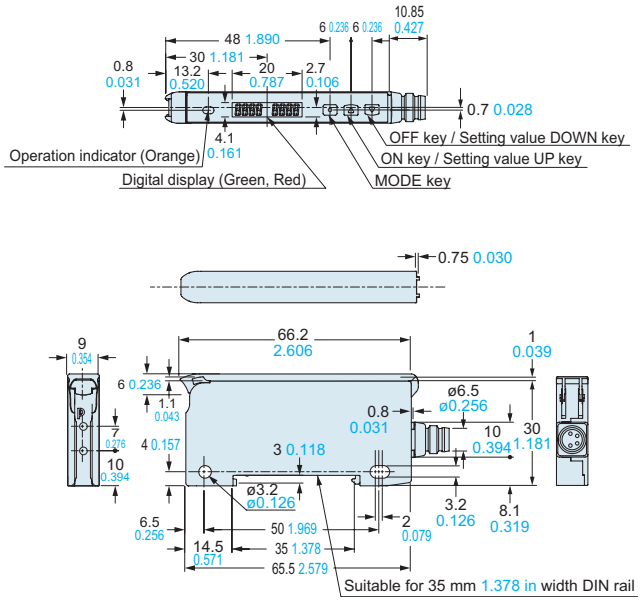
The CAD data in the dimensions can be downloaded from our website.

FX-101□ FX-102□ Amplifier



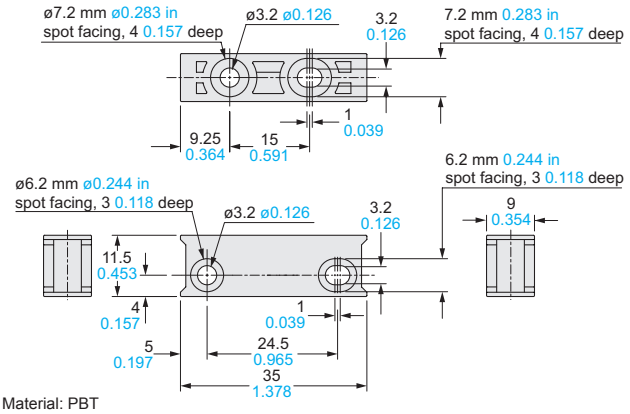
Note: The protection cover has been attached from the production at July, 2011.

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



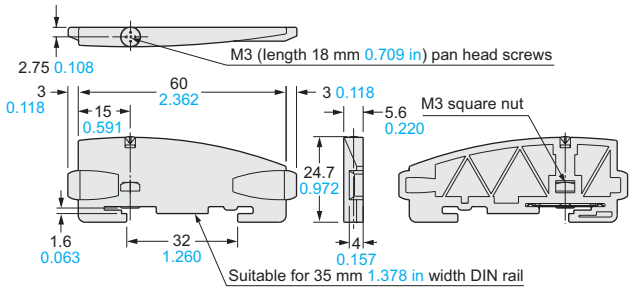
Note: The protection cover has been attached from the production at July, 2011.

MS-DIN-4 Amplifier mounting bracket (Optional)



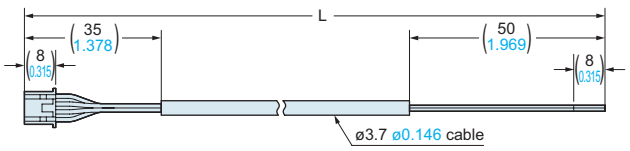
Material: PBT

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