

# FX-500 SERIES Ver.2

FIBER SENSORS

LASER SENSORS

PHOTOELECTRIC SENSORS

MICRO PHOTOELECTRIC SENSORS

AREA SENSORS

SAFETY 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 CONTROL DEVICES

LASER MARKERS

PLC

HUMAN MACHINE INTERFACES

ENERGY MANAGEMENT SOLUTIONS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Selection Guide

Fibers

Fiber Amplifiers

Other Products

FX-500

FX-550

FX-100

FX-410

- General terms and conditions..... F-3
- Selection guide..... P.3~
- Fiber selection..... P.5~
- SC-GU3.....P.971~
- Glossary of terms..... P.1549~
- General precautions..... P.1552~
- Korea's S-mark..... P.1602

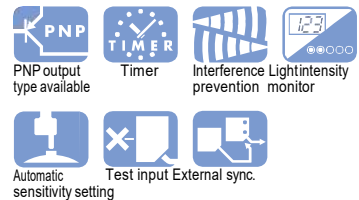
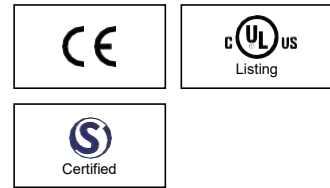
Related Information

Ver.2



\* There is no change in Model No. and price due to version upgrade.  
\* Cover opened state is shown.

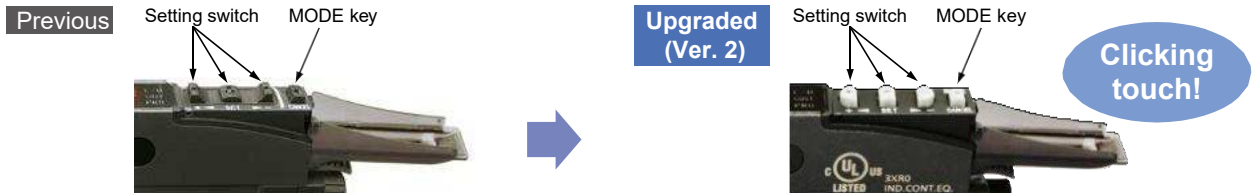
[panasonic.net/id/pidsx/global](http://panasonic.net/id/pidsx/global)



## At the industry's leading edge

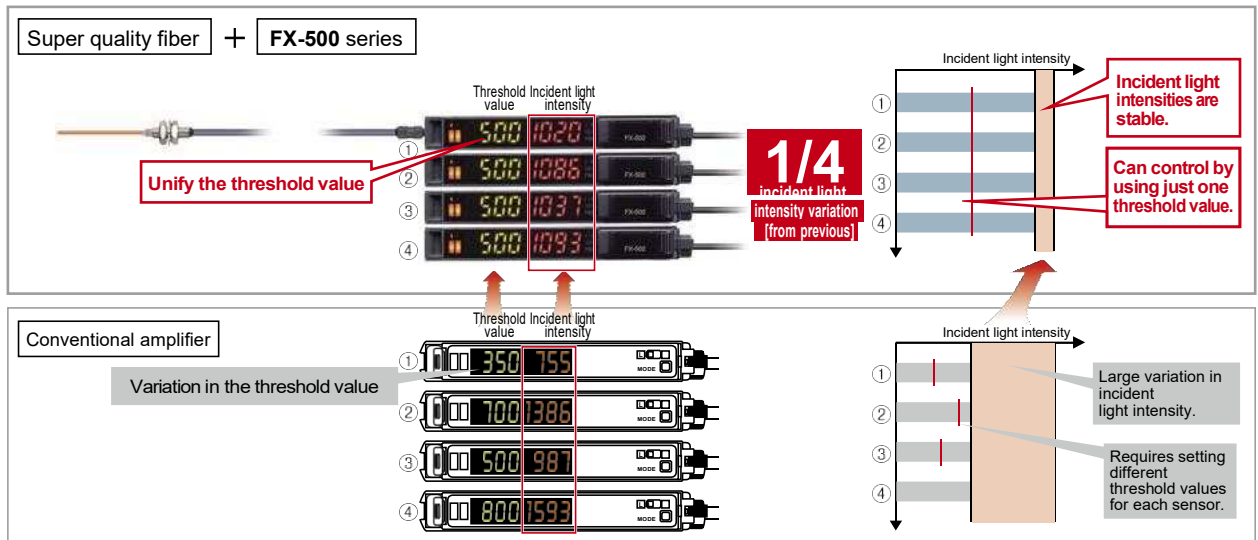
### Improved the operability and visibility of the operation keys

Operation keys (setting switch and MODE key) have been renewed to be easy to operate. Also, the color of the keys has been changed from black to light gray to achieve good visibility in dim light.



### High stability!

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



## A quality that surpassed that of standard fibers!

New fibers developed using a new manufacturing method adopted by our own factory along with a persistent quality control system.  
The basic performance of a standard fiber is greatly enhanced!

### Stable emission amount $\pm 10$

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

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

### $\phi 2.2\ \text{mm}$ $\phi 0.087\ \text{in}$ standard fiber

**New material**  
Single core standard fiber with high flexibility

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

### Expanded temperature range

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

**$-55$  to  $+80^\circ\text{C}$**   
 **$-67$  to  $+176^\circ\text{F}$**

**1.2 times** more than previous model

### More flexible! **R4**

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

**R4mm**  
**R0.157in**

**1/6** of that of previous model

### Integrated high-precision plug

The centering precision of the fiber core attached to the inserting plug is doubled. As the insertion precision is increased, the variation among units can be greatly suppressed.

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

### More bendable!

Bending durability [Previous model is 1,000 times]

**10 million times**

**10,000 times** more than previous model

\* Bending conditions  
Bending radius:  $R10\ \text{mm}$  /  $R0.394\ \text{in}$ ,  
Reciprocating bending  $180^\circ$

## Max. 25 $\mu\text{s}$ response time

**FX-500** with its high response time contributes to improve productivity.



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

## Hyper **HYPR mode** incorporated

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

**Tough** **FD-41**

**Previous** **FD-NFM2**

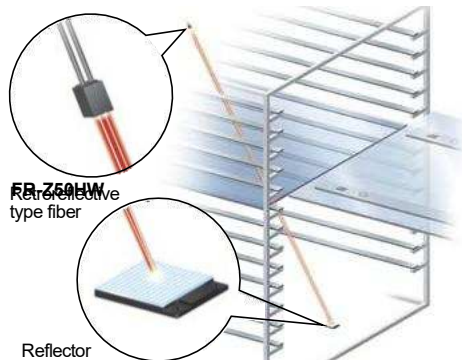
**Max. 5.7 times!** (Note) longer than the previous model

Note: When using **FD-NFM2**.

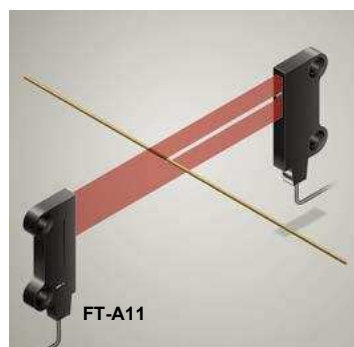
## So accurate! Sharp detection with suppressed hysteresis

**FX-500** with its accurate detection catches fractional differences in light intensity, achieving high precision and solving low-hysteresis applications.

- Long range detection of small objects with small difference in light intensity **H-02 mode**



- Highly accurate detection while avoiding saturation **H-01 mode**



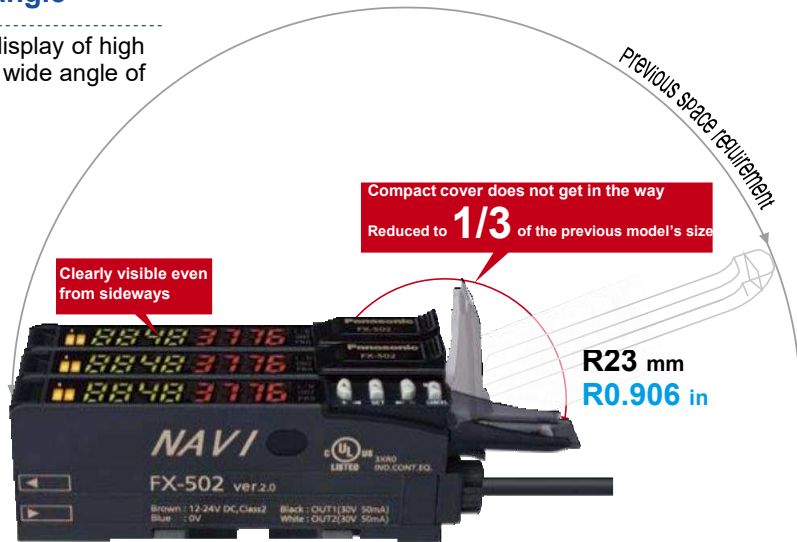
- FIBER SENSORS
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- PRESSURE / FLOW SENSORS
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- PARTICULAR USE SENSORS
- SENSOR OPTIONS
- SIMPLE WIRE-SAVING UNITS
- WIRE-SAVING SYSTEMS
- MEASUREMENT SENSORS
- STATIC CONTROL DEVICES
- LASER MARKERS
- PLC
- HUMAN MACHINE INTERFACES
- ENERGY MANAGEMENT SOLUTIONS
- FA COMPONENTS
- MACHINE VISION SYSTEMS
- UV CURING SYSTEMS
- Selection Guide
- Fibers
- Fiber Amplifiers
- Other Products

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- FX-550**
- FX-100**
- FX-410**

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PRESSURE / FLOW SENSORS
INDUCTIVE PROXIMITY SENSORS
PARTICULAR USE SENSORS
SENSOR OPTIONS
SIMPLE WIRE-SAVING UNITS
WIRE-SAVING SYSTEMS
MEASUREMENT SENSORS
STATIC CONTROL DEVICES
LASER MARKERS
PLC
HUMAN MACHINE INTERFACES
ENERGY MANAGEMENT SOLUTIONS
FA COMPONENTS
MACHINE VISION SYSTEMS
UV CURING SYSTEMS
Selection Guide
Fibers
Fiber Amplifiers
Other Products
<b>FX-500</b>
<b>FX-550</b>
<b>FX-100</b>
<b>FX-410</b>

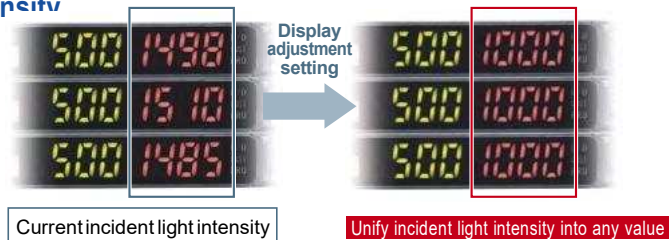
### Flat display with wide viewing angle

The large and high-contrast 7-segment display of high luminance provides clear visibility from a wide angle of view.



### Resolves variation in displayed incident light intensity Display adjustment setting

The variation in display can be adjusted to random values. This helps to define proper instruction in a work order.



### Stable detection over long and short periods Stabilized emission amount

The "four-chemical emitting element", which we are the first to incorporate to maintain a stable level of light emission, has now become an industry standard. **FX-500** series continues to adopt the same emitting element as well as the "APC (Auto Power Control) circuit" which improves stability in short periods such as when the power is turned on.

### Saves maintenance time Threshold tracking function

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). This contributes to reduction in maintenance hours.

### Suitable for preventative maintenance Self-diagnosis output

**FX-502(P)**  
**FX-505(P)-C2**

**FX-502(P) / 505(P)-C2** can set Output 2 as a self-diagnosis output. When the teaching of Output 1's threshold value is carried out, Output 2 is set concurrently with the setting randomly shifted by the amount of surplus of threshold value. Light intensity deterioration due to fiber breakage or dust accumulation can be notified as an alarm output.

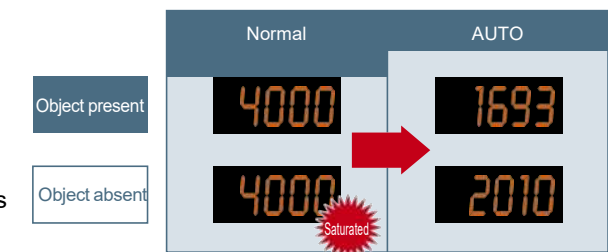
- Detect deterioration in light intensity (e.g. Useful in dusty environment)



Self-diagnosis can be used with the threshold tracking function for added effectiveness.

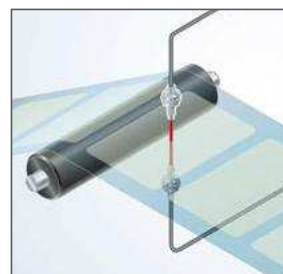
### Stable detection while being eco-friendly Emission power & gain setting

In cases when the incident light intensity is saturated, the light emitting amount can be adjusted to the optimal level by AUTO without changing the response time. This allows stable detection with an optimal S/N ratio and saves energy by controlling the emitting electric current.



Auto mode (AUTO) and 3-level manual mode (H / M / L [fine-adjustable]) are incorporated.

- Detecting a transparent sheet

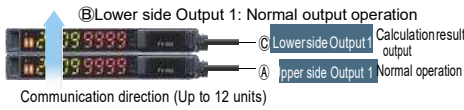


## Built-in logic functions No PLC necessary, saving material and programming costs

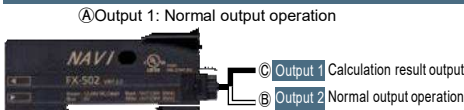
### Logical calculation functions

3 logical calculations (AND, OR, XOR) are available with fiber sensor only. 3 logical operations can be selected against Output 1. Additional controller is not required so both wire-saving and cost reduction can be achieved.

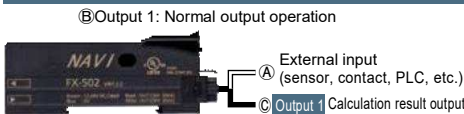
#### Calculation of two neighboring amplifiers



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

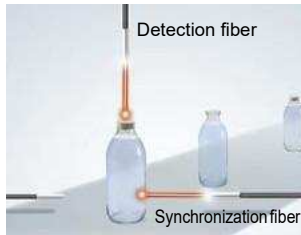


#### Calculation of one amplifier and external input FX-502(P)/505(P)-C2



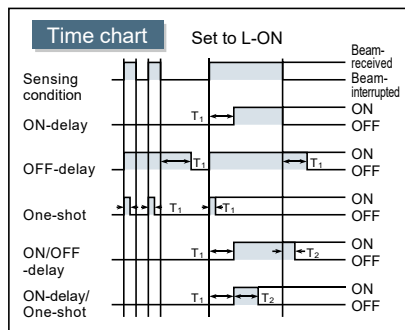
### Truth table

A	B	Logical calculation output (C)		
		AND	OR	XOR
ON	ON	ON	ON	OFF
OFF	ON	OFF	ON	ON
ON	OFF	OFF	ON	ON
OFF	OFF	OFF	OFF	OFF



### Equipped with 5 timer types

A wide variety of timer control operations can be carried out by fiber sensors only.

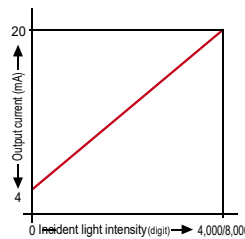


Timer period: 0.05 ms to 32 s  
Output 1 has ON/OFF-delay and ON-delay/One-shot timers available.

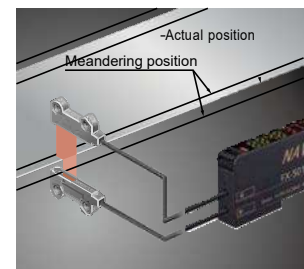
### Analog output cable type

**FX-505(P)-C2**

To monitor the sensing of objects, a 4 to 20 mA analog current is output in response to the digital value of the incident light intensity.



#### Edge tracking of film or sheet



The meandering path can be monitored as the light intensity changes.

### Smooth setup changes by 8 data banks

The number of data banks used for saving the setup conditions of the amplifier is increased to eight. Setup conditions can be saved and loaded to make setup changes easy at a worksite where multiple models are manufactured.

### Remote control improves work efficiency by external input

**FX-502(P)**  
**FX-505(P)-C2**

Work efficiency can be improved by operating via PLC output or other external signal.\*

\* **FX-502(P)** can operate via external signal when switching from Output 2 to external input.

#### Functions operable by external input

Full-auto * / Limit * / 2-point teaching *	Display adjustment setting *
Data bank load * / save *	Logical calculation (self-unit only)
Emission halt	Copying function lock (self-unit only)

\* **FX-505(P)-C2** can obtain answer back output after external input, when sensing output 2 is set to answer back output mode.

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PHOTOELECTRIC SENSORS

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AREA SENSORS

SAFETY 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 CONTROL DEVICES

LASER MARKERS

PLC

HUMAN MACHINE INTERFACES

ENERGY MANAGEMENT SOLUTIONS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Selection Guide

Fibers

Fiber Amplifiers

Other Products

**FX-500**

**FX-550**

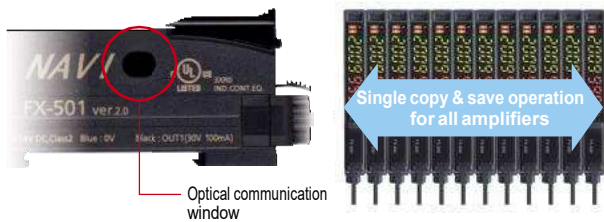
**FX-100**

**FX-410**

- FIBER SENSORS
- LASER SENSORS
- PHOTO-ELECTRIC SENSORS
- MICRO PHOTO-ELECTRIC SENSORS
- AREA SENSORS SAFETY LIGHT CURTAIN/ SAFETY COMPONENTS
- PRESSURE / FLOW SENSORS
- INDUCTIVE PROXIMITY SENSORS
- PARTICULAR USE SENSORS
- SENSOR OPTIONS
- SIMPLE WIRE-SAVING UNITS
- WIRE-SAVING SYSTEMS
- MEASUREMENT SENSORS
- STATIC CONTROL DEVICES
- LASER MARKERS
- PLC
- HUMAN MACHINE INTERFACES
- ENERGY MANAGEMENT SOLUTIONS
- FA COMPONENTS
- MACHINE VISION SYSTEMS
- UV CURING SYSTEMS
- Selection Guide
- Fibers
- Fiber Amplifiers
- Other Products
- FX-500**
- FX-550**
- FX-100**
- FX-410**

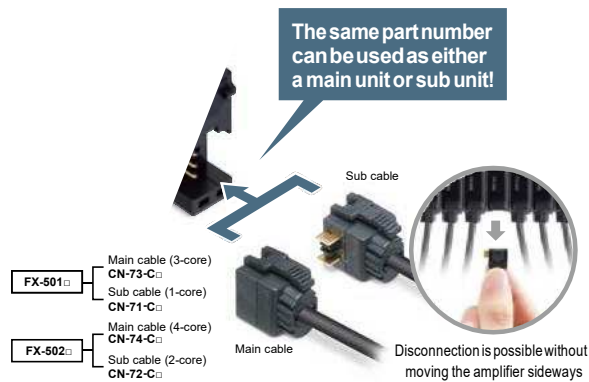
### An optical communication function allows sensors to be adjusted simultaneously

The data that is currently set can be copied and saved all at once for all amplifiers connected together from the right side thanks to the optical communication function. This greatly reduces troublesome setup tasks and makes setup much smoother.



### No need to specify a main unit or sub unit

All **FX-500** amplifiers can be used as either a main unit or a sub unit. Just use a main cable or a sub cable to distinguish the two. This reduces the costs of inventory management.



## ORDER GUIDE

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

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

- Selection Guide
- Fibers
- Fiber Amplifiers
- Other Products
- FX-500**
- FX-550**
- FX-100**
- FX-410**

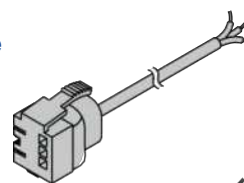
## ORDER GUIDE

### Quick-connection cables

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

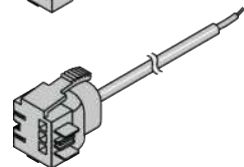
Type	Model No.	Length	Description
Main cable (3-core)	<b>CN-73-C1</b>	Length: 1 m <b>3.281 ft</b>	0.2 mm <sup>2</sup> 3-core cabtyre cable, with connector on one end Cable outer diameter: ø3.3 mm ø0.130 in
	<b>CN-73-C2</b>	Length: 2m <b>6.562 ft</b>	
	<b>CN-73-C5</b>	Length: 5 m <b>16.404 ft</b>	
Sub cable (1-core)	<b>CN-71-C1</b>	Length: 1 m <b>3.281 ft</b>	0.2 mm <sup>2</sup> 1-core cabtyre cable, with connector on one end Cable outer diameter: ø3.3 mm ø0.130 in Connectable to a main cable up to 15 cables.
	<b>CN-71-C2</b>	Length: 2m <b>6.562 ft</b>	
	<b>CN-71-C5</b>	Length: 5 m <b>16.404 ft</b>	

**Main cable**  
• **CN-73-C□**



**Sub cable**

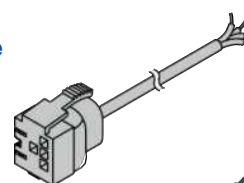
• **CN-71-C□**



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

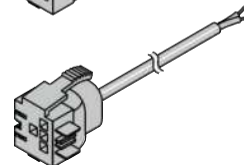
Type	Model No.	Length	Description
Main cable (4-core)	<b>CN-74-C1</b>	Length: 1 m <b>3.281 ft</b>	0.2 mm <sup>2</sup> 4-core cabtyre cable, with connector on one end Cable outer diameter: ø3.3 mm ø0.130 in
	<b>CN-74-C2</b>	Length: 2m <b>6.562 ft</b>	
	<b>CN-74-C5</b>	Length: 5 m <b>16.404 ft</b>	
Sub cable (2-core)	<b>CN-72-C1</b>	Length: 1 m <b>3.281 ft</b>	0.2 mm <sup>2</sup> 2-core cabtyre cable, with connector on one end Cable outer diameter: ø3.3 mm ø0.130 in Connectable to a main cable up to 15 cables.
	<b>CN-72-C2</b>	Length: 2m <b>6.562 ft</b>	
	<b>CN-72-C5</b>	Length: 5 m <b>16.404 ft</b>	

**Main cable**  
• **CN-74-C□**

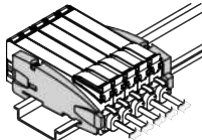


**Sub cable**

• **CN-72-C□**



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

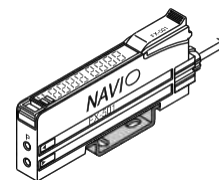
Appearance	Model No.	Description
	<b>MS-DIN-E</b>	When amplifiers are mounted in cascade, or when an amplifier moves depending on the way it is installed on a DIN rail, these end plates clamp amplifiers into place on both sides. Make sure to use end plates when cascading multiple amplifiers together. 2 pcs. per set

## OPTIONS

Designation	Model No.	Description
Amplifier mounting bracket	<b>MS-DIN-2</b>	Mounting bracket for amplifier

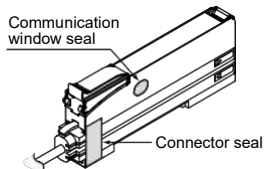
**Amplifier mounting bracket**

• **MS-DIN-2**



### Accessory

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



## LIST OF FIBERS

Refer to "Fiber Selection p.5 ~" for details of each fiber.

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PARTICULAR USE SENSORS

SENSOR OPTIONS

SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASUREMENT SENSORS

STATIC CONTROL DEVICES

LASER MARKERS

PLC

HUMAN MACHINE INTERFACES

ENERGY MANAGEMENT SOLUTIONS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Selection Guide

Fibers

Fiber Amplifiers

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**FX-500**

**FX-550**

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## SPECIFICATIONS

Item	Model No.	Type	Standard type	2-output type	Cable type (Analog output type)		
		NPN output	<b>FX-501</b>	<b>FX-502</b>	<b>FX-505-C2</b>		
		PNP output	<b>FX-501P</b>	<b>FX-502P</b>	<b>FX-505P-C2</b>		
CE marking directive compliance		EMC Directive, RoHS Directive					
Supply voltage		12 to 24 V DC: $\pm 10\%$ Ripple P-P 10 % or less					
Power consumption		Normal operation: 960 mW or less (current consumption 40 mA or less at 24 V supply voltage, excluding analog output of cable type) ECO mode: 680 mW or less (current consumption 28 mA or less at 24 V supply voltage, excluding analog output of cable type)					
Output (2-output type and cable type: Output 1, Output 2)		<NPN output type> NPN open-collector transistor • Maximum sink current: 100 mA (2-output type and cable type are 50 mA) (Note 2) • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 2 V or less (Note 3) (at maximum sink current)		<PNP output type> PNP open-collector transistor • Maximum source current: 100 mA (2-output type and cable type are 50 mA) (Note 2) • Applied voltage: 30 V DC or less (between output and +V) • Residual voltage: 2 V or less (Note 3) (at maximum source current)			
		Output points		1 point		2 points	
		Output operation		Switchable either Light-ON or Dark-ON by L/D mode			
		Short-circuit protection		Incorporated			
Response time		H-SP: 25 $\mu$ s or less, FAST: 60 $\mu$ s or less, STD: 250 $\mu$ s or less, LONG: 2 ms or less, U-LG: 4 ms or less, HYPR: 24 ms or less, selectable					
Analog output (Cable type only)		Output current: 4 to 20 mA approx. [H-SP, FAST, STD: At 0 to 4,000 digits, LONG: At 0 to 8,000 digits (Note 4)], Response time: 2 ms or less, Zero point: Within 4 mA $\pm 1\%$ F.S., Span: Within 16 mA $\pm 5\%$ F.S., Linearity: Within $\pm 3\%$ F.S., Load resistance: 0 to 250 $\Omega$					
External input (2-output type only, switchable with Output 2)		————		<NPN output type> NPN non-contact input • Signal condition High: +8 V to +V DC or Open Low: 0 to +1.2 V DC (at 0.5 mA source current) • Input impedance: 10 k $\Omega$ approx.	<PNP output type> PNP non-contact input • Signal condition High: +4 V to +V DC (at 3 mA sink current) Low: 0 to +0.6 V DC or Open • Input impedance: 10 k $\Omega$ approx.		
Possible external input function		————		Emission halt / Teaching (Full-auto, Limit, 2-point) / Logic operation setting / Copy lock / Display adjustment / Data bank load / Data bank save, selectable			
Sensitivity setting		2-point teaching / Limit teaching / Full-auto teaching / Manual adjustment					
Incident light intensity display range		H-SP / FAST / STD: 0 to 4,000, LONG: 0 to 8,000, U-LG / HYPR: 0 to 9,999					
Timer function		Incorporated with variable OFF-delay / ON-delay / One-shot / ON OFF-delay / ON-delay • One-shot timer, switchable either effective or ineffective		<Output 1> Incorporated with variable OFF-delay / ON-delay / One-shot / ON OFF-delay / ON-delay • One-shot timer, switchable either effective or ineffective			
				<Output 2> Incorporated with variable OFF-delay / ON-delay / One-shot timer, switchable either effective or ineffective			
Timer period		Timer range "ms": 0.5 ms approx., 1 to 9,999 ms approx., 1 ms approx., Timer range "sec.": 0.5 s approx., 1 to 32 s approx., 1 s approx., Timer range "1/10 ms": 0.05 ms approx., 0.1 to 999.9 ms approx., 0.1 ms approx., each output is set individually					
Light emitting amount selection function		Incorporated, 3 levels (each level 25 to 100 %) + Auto setting [1 level (25 to 100 %) when using H-SP mode]					
Interference prevention function		Incorporated (Note 5), selectable either automatic interference prevention or different frequency					
Various settings		Hysteresis setting / Shift amount setting / Emission power setting / Display turning setting / ECO setting / Data bank loading saving setting / Copying setting / Code setting / Reset setting / Logical calculation setting / Threshold value tracking setting, etc.					
Protection		IP40 (IEC)					
Ambient temperature		-10 to +55 °C +14 to +131 °F [If 4 to 7 units are mounted in cascade: -10 to +50 °C +14 to +122 °F or if 8 to 16 units (cable type: 8 to 12 units) are mounted in cascade: -10 to +45 °C +14 to +113 °F] (No dew condensation or icing allowed), Storage: -20 to +70 °C -4 to +158 °F					
Emitting element (modulated)		Red LED (Peak emission wavelength: 643 nm 0.025 mil)					
Material		Enclosure, Case cover: Polycarbonate, Switch: Polyacetal					
Cable		————		0.2 mm <sup>2</sup> 6-core cable, 2 m 6.562 ft long			
Cable extension		————		Extension up to total 100 m 328.084 ft is possible with 0.3 mm <sup>2</sup> , or more, cable. (however, supply voltage 12 V DC or more)			
Weight		Net weight: 15 g approx., Gross weight: 70 g approx.		Net weight: 60 g approx., Gross weight: 100 g approx.			
Accessory		FX-MB1 (Amplifier protection seal): 1 set					

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

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

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

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

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

Number of sensor heads which is possible to be mounted closely in different frequency Interference prevention function is up to 3 units.

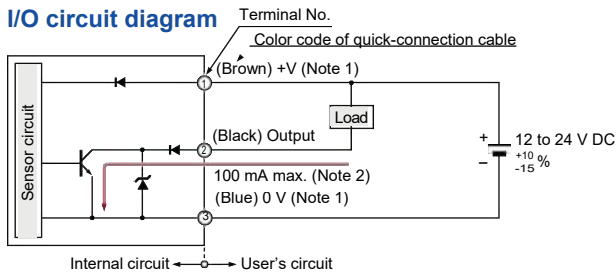
• Number of sensor heads mountable closely (Unit: set)

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

## I/O CIRCUIT AND WIRING DIAGRAMS

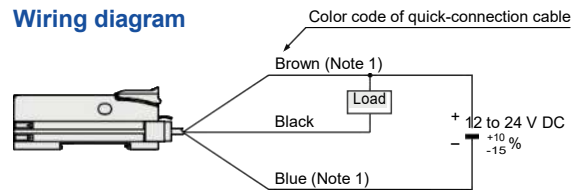
### FX-501

NPN output type



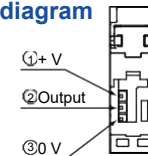
Notes: 1) The quick-connection sub cable does not have +V (brown) and 0 V (blue). The power is supplied from the connector of the main cable.  
2) 50 mA max., if five amplifiers or more, are connected together.

### Wiring diagram



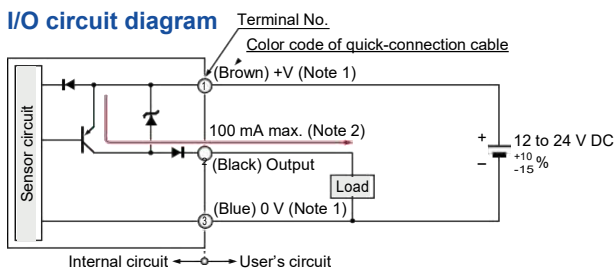
Note: The quick-connection sub cable does not have a brown and a blue lead wire.

### Terminal arrangement diagram



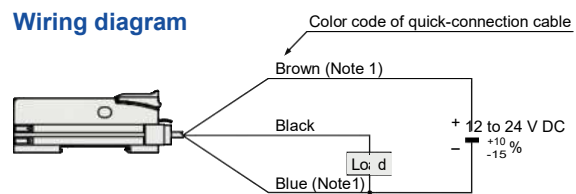
### FX-501P

PNP output type



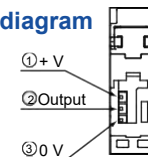
Notes: 1) The quick-connection sub cable does not have +V (brown) and 0 V (blue). The power is supplied from the connector of the main cable.  
2) 50 mA max., if five amplifiers or more, are connected together.

### Wiring diagram



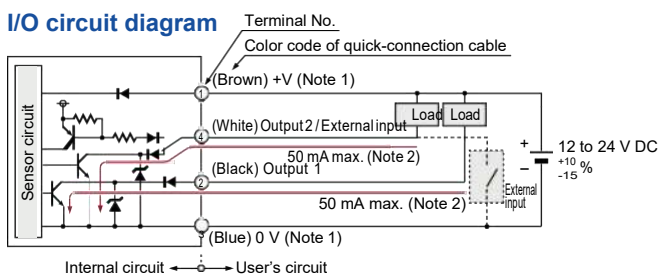
Note: The quick-connection sub cable does not have a brown and a blue lead wire.

### Terminal arrangement diagram



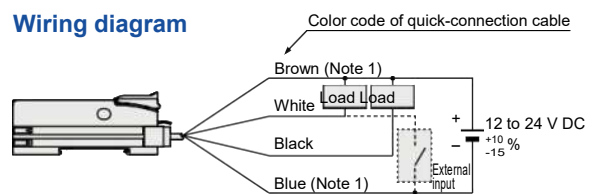
### FX-502

NPN output type



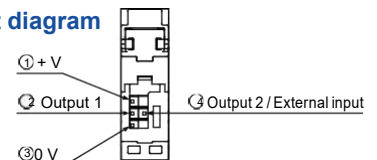
Notes: 1) The quick-connection sub cable does not have +V (brown) and 0 V (blue). The power is supplied from the connector of the main cable.  
2) 25 mA max., if five amplifiers or more, are connected together.

### Wiring diagram



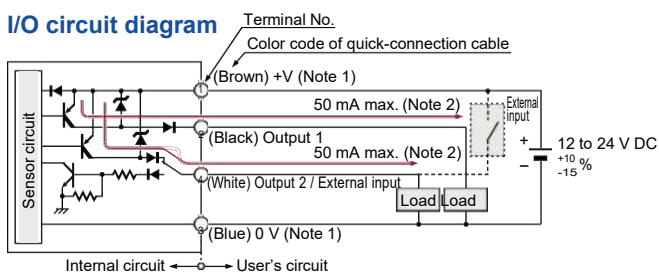
Note: The quick-connection sub cable does not have a brown and a blue lead wire.

### Terminal arrangement diagram



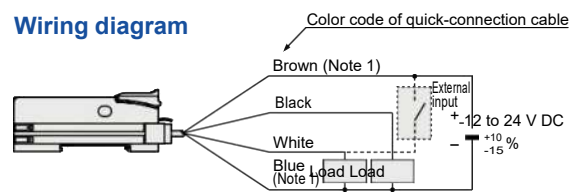
### FX-502P

PNP output type



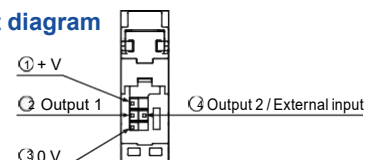
Notes: 1) The quick-connection sub cable does not have +V (brown) and 0 V (blue). The power is supplied from the connector of the main cable.  
2) 25 mA max., if five amplifiers or more, are connected together.

### Wiring diagram



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

### Terminal arrangement diagram



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LASER SENSORS

PHOTO-ELECTRIC SENSORS

MICRO PHOTO-ELECTRIC SENSORS

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SENSOR OPTIONS

SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASUREMENT SENSORS

STATIC CONTROL DEVICES

LASER MARKERS

PLC

HUMAN MACHINE INTERFACES

ENERGY MANAGEMENT SOLUTIONS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Selection Guide

Fibers

Fiber Amplifiers

Other Products

FX-500

FX-550

FX-100

FX-410



**I/O CIRCUIT AND WIRING DIAGRAMS**

FIBER SENSORS

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PHOTO-ELECTRIC SENSORS

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COMPONENTS

PRESSURE / FLOW SENSORS

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SENSOR OPTIONS

SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASUREMENT SENSORS

STATIC CONTROL DEVICES

LASER MARKERS

PLC

HUMAN MACHINE INTERFACES

ENERGY MANAGEMENT SOLUTIONS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Selection Guide

Fibers

Fiber Amplifiers

Other Products

**FX-500**

**FX-550**

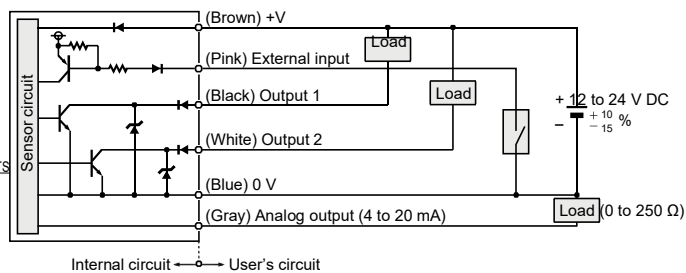
**FX-100**

**FX-410**

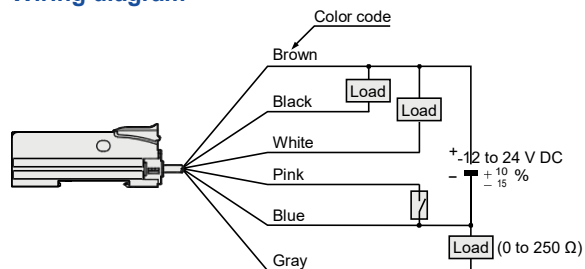
**FX-505-C2**

NPN output type

**I/O circuit diagram**



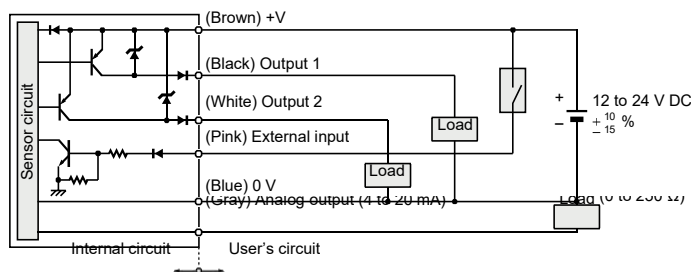
**Wiring diagram**



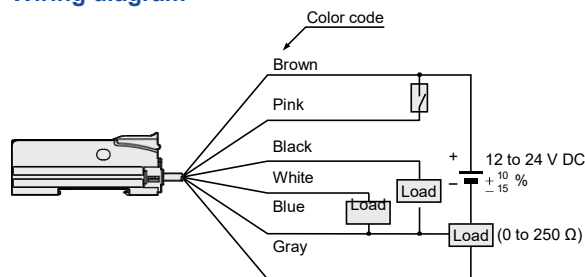
**FX-505P-C2**

PNP output type

**I/O circuit diagram**



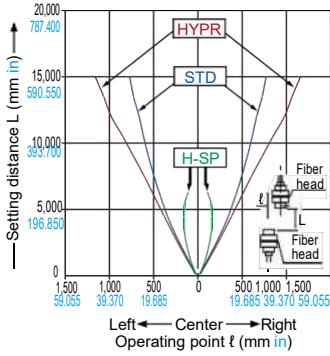
**Wiring diagram**



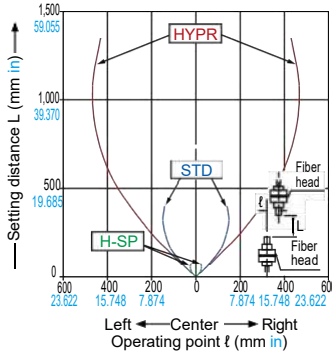
**SENSING CHARACTERISTICS (TYPICAL)**

**Thru-beam type Parallel deviation** Sensing characteristics are listed in the alphabetic order of Model No.

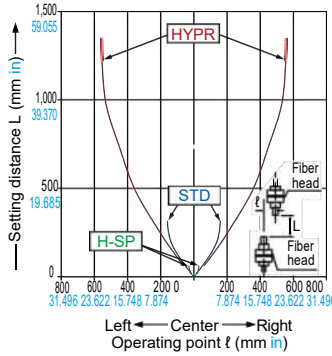
**FT-140** Thru-beam type



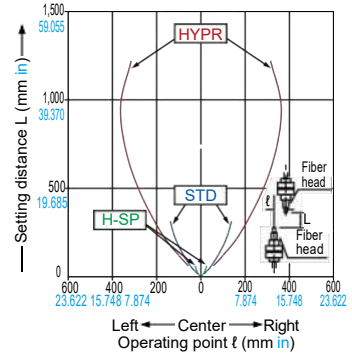
**FT-30** Thru-beam type



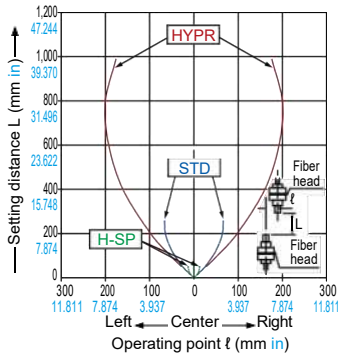
**FT-31** Thru-beam type



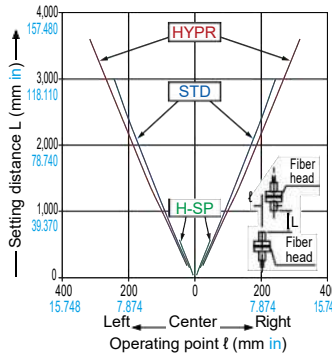
**FT-31S** Thru-beam type



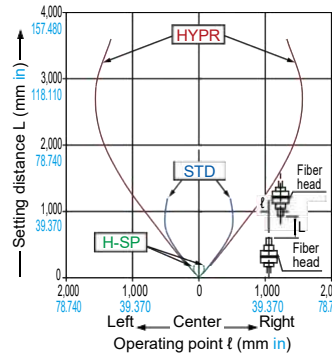
**FT-31W** Thru-beam type



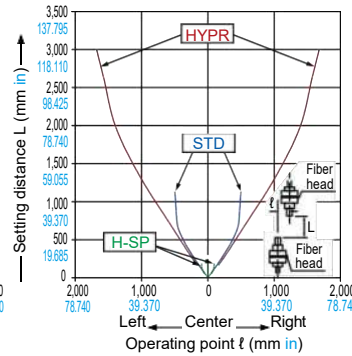
**FT-32** Thru-beam type



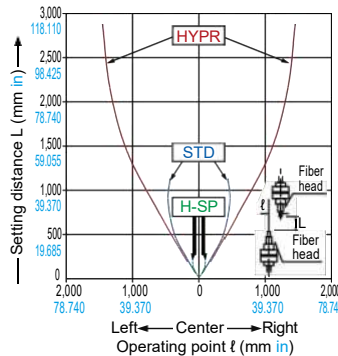
**FT-40** Thru-beam type



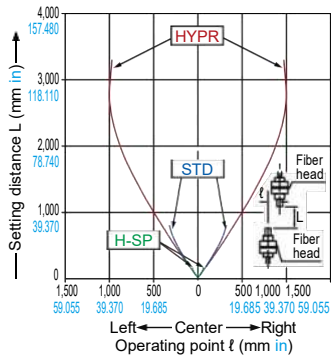
**FT-42** Thru-beam type



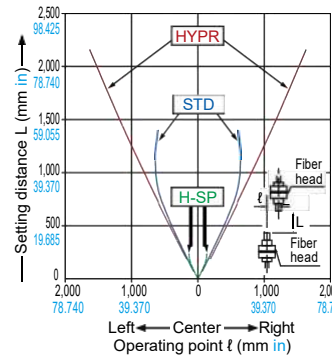
**FT-42S** Thru-beam type



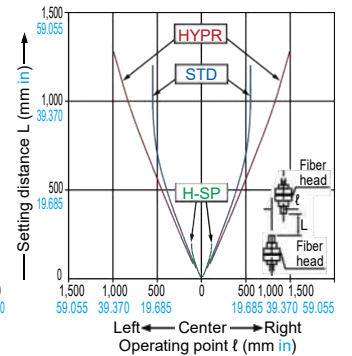
**FT-42W** Thru-beam type



**FT-43** Thru-beam type

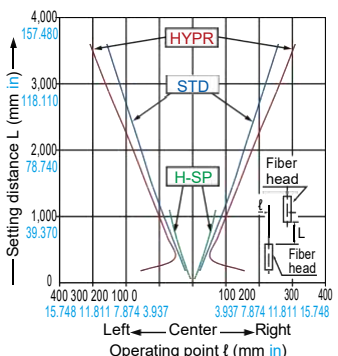


**FT-45X** Thru-beam type

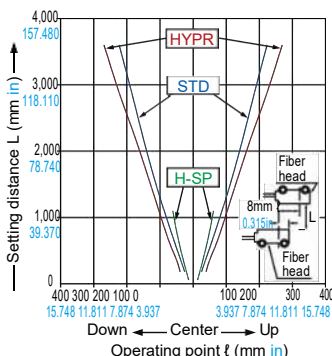


**FT-A11** Thru-beam type

Horizontal direction

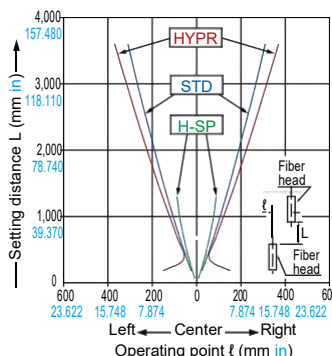


Vertical direction

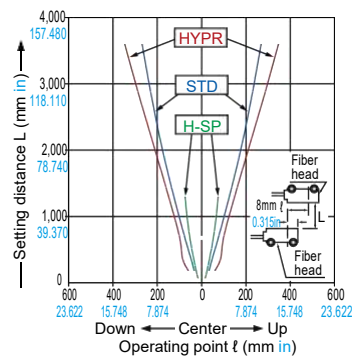


**FT-A11W** Thru-beam type

Horizontal direction



Vertical direction



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AREA SENSORS

SAFETY 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 CONTROL DEVICES

LASER MARKERS

PLC

HUMAN MACHINE INTERFACES

ENERGY MANAGEMENT SOLUTIONS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Selection Guide

Fibers

Fiber Amplifiers

Other Products

**FX-500**

**FX-550**

**FX-100**

**FX-410**

**SENSING CHARACTERISTICS (TYPICAL)**

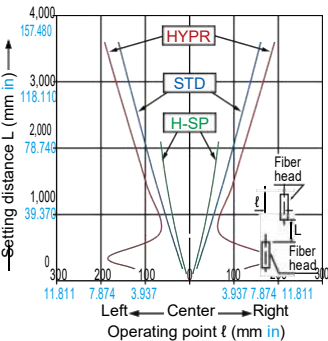
**Thru-beam type Parallel deviation** Sensing characteristics are listed in the alphabetic order of Model No. (Models with same sensing characteristics are grouped together.)

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PARTICULAR USE SENSORS
SENSOR OPTIONS
SIMPLE WIRE-SAVING UNITS
WIRE-SAVING SYSTEMS
MEASUREMENT SENSORS
STATIC CONTROL DEVICES
LASER MARKERS
PLC
HUMAN MACHINE INTERFACES
ENERGY MANAGEMENT SOLUTIONS
FA COMPONENTS
MACHINE VISION SYSTEMS
UV CURING SYSTEMS
Selection Guide
Fibers
Fiber Amplifiers
Other Products

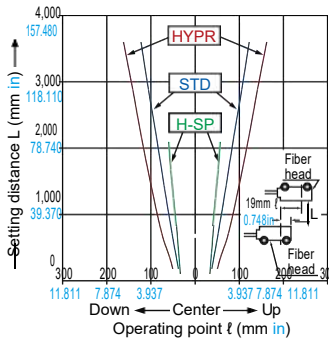
**FT-A32**

Thru-beam type

Horizontal direction



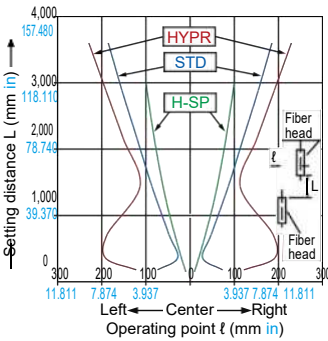
Vertical direction



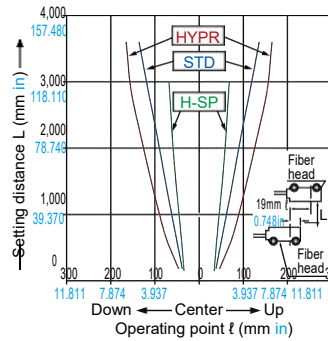
**FT-A32W**

Thru-beam type

Horizontal direction



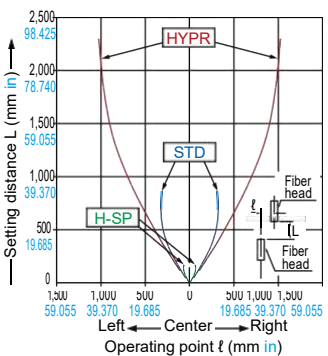
Vertical direction



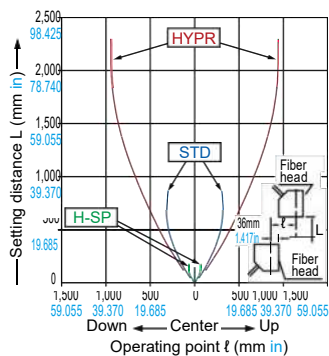
**FT-AL05**

Thru-beam type

Horizontal direction



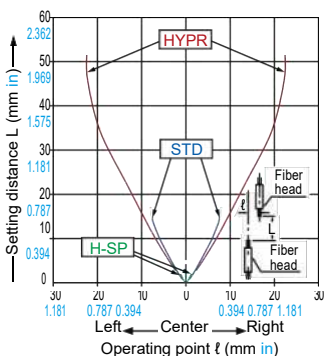
Vertical direction



**FT-E13**

Thru-beam type

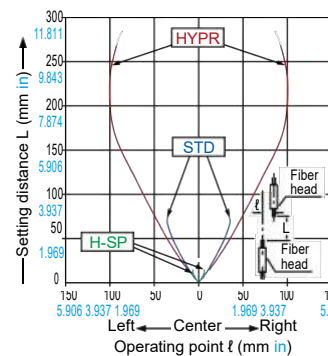
Horizontal direction



**FT-E23**

Thru-beam type

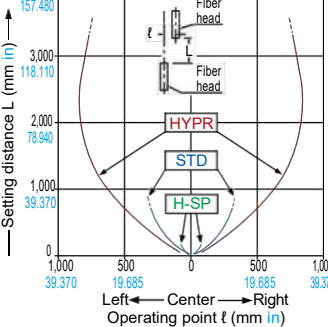
Vertical direction



**FT-H13-FM2**

Thru-beam type

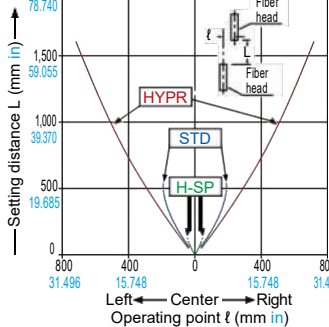
Horizontal direction



**FT-H20-J20-S FT-H20-J30-S FT-H20-J50-S**

Thru-beam type

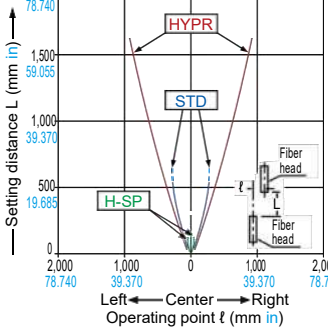
Vertical direction



**FT-H20-M1**

Thru-beam type

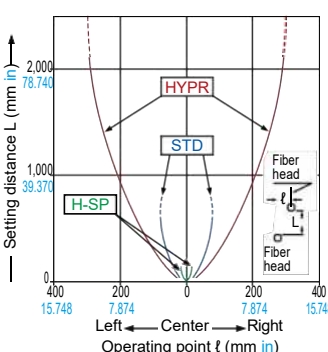
Horizontal direction



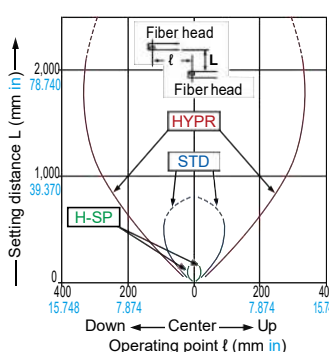
**FT-H20-VJ50-S FT-H20-VJ80-S**

Thru-beam type

Horizontal direction



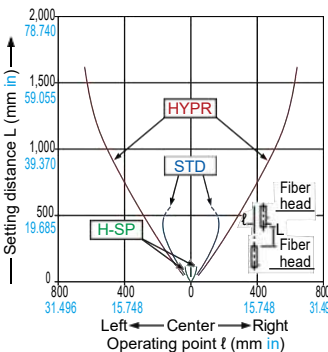
Vertical direction



**FT-H20W-M1**

Thru-beam type

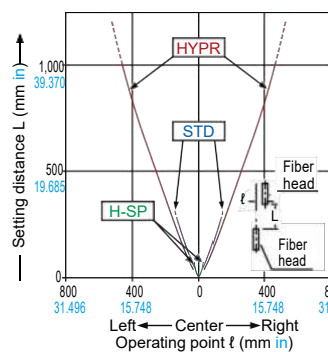
Horizontal direction



**FT-H30-M1V-S**

Thru-beam type

Vertical direction



**FX-500**

**FX-550**

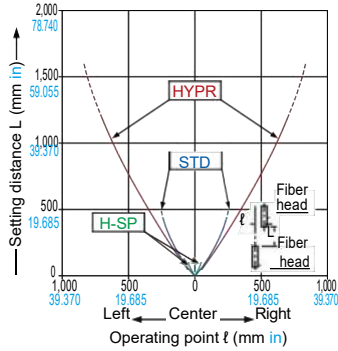
**FX-100**

**FX-410**

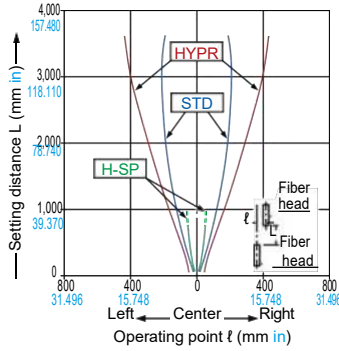
**SENSING CHARACTERISTICS (TYPICAL)**

**Thru-beam type Parallel deviation** Sensing characteristics are listed in the alphabetic order of Model No. (Models with same sensing characteristics are grouped together.)

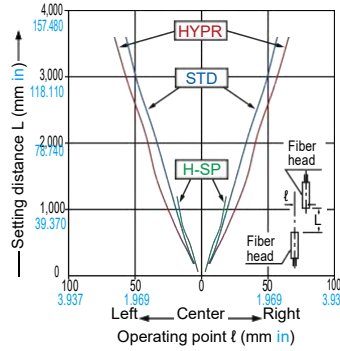
**FT-H35-M2** Thru-beam type  
**FT-H35-M2S6**



**FT-HL80Y** Thru-beam type

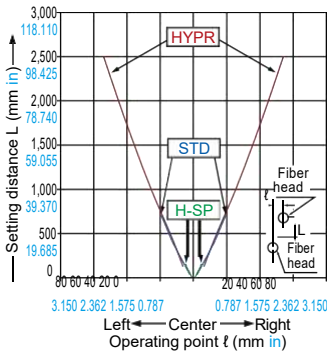


**FT-KS40** Thru-beam type

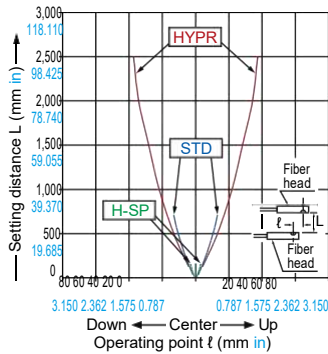


**FT-KV26** Thru-beam type

Horizontal direction

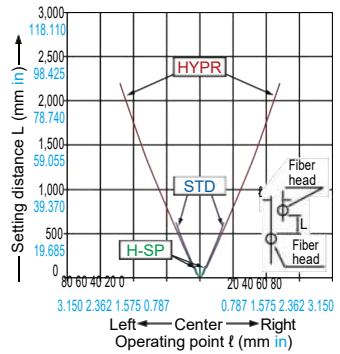


Vertical direction

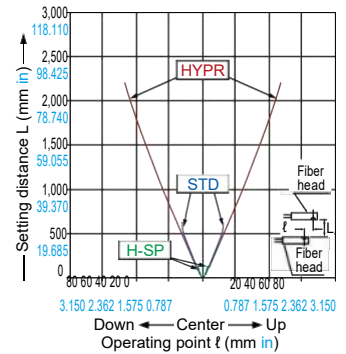


**FT-KV26H1** Thru-beam type

Horizontal direction

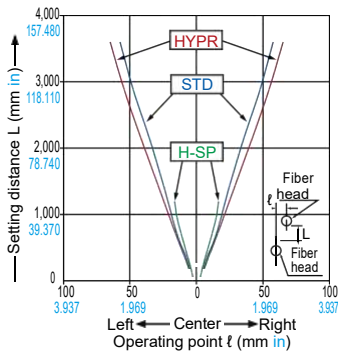


Vertical direction

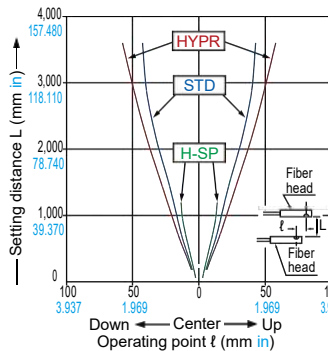


**FT-KV40** Thru-beam type

Horizontal direction

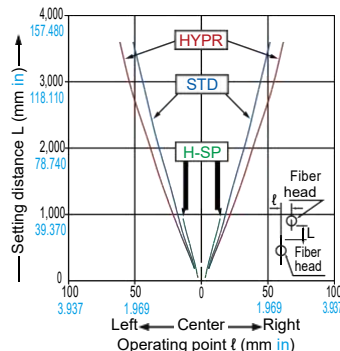


Vertical direction

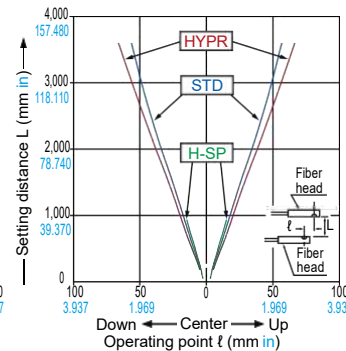


**FT-KV40W** Thru-beam type

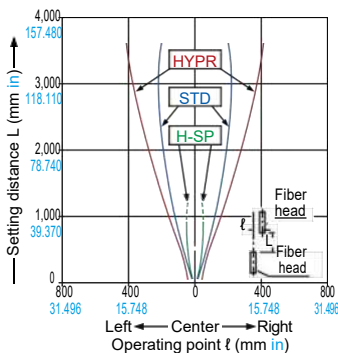
Horizontal direction



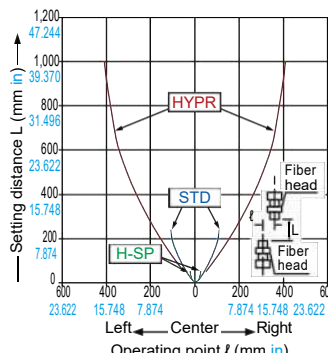
Vertical direction



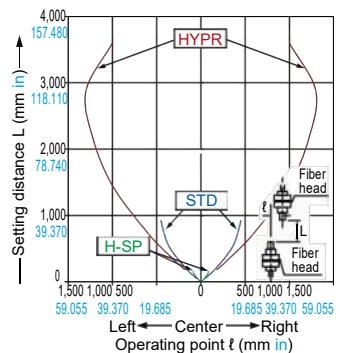
**FT-L80Y** Thru-beam type



**FT-R31** Thru-beam type



**FT-R40** Thru-beam type



FIBER SENSORS

LASER SENSORS

PHOTO-ELECTRIC SENSORS

MICRO PHOTO-ELECTRIC SENSORS

AREA SENSORS

SAFETY 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 CONTROL DEVICES

LASER MARKERS

PLC

HUMAN MACHINE INTERFACES

ENERGY MANAGEMENT SOLUTIONS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Selection Guide

Fibers

Fiber Amplifiers

Other Products

**FX-500**

**FX-550**

**FX-100**

**FX-410**

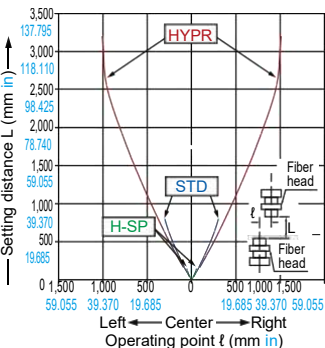
**SENSING CHARACTERISTICS (TYPICAL)**

**Thru-beam type Parallel deviation** Sensing characteristics are listed in the alphabetic order of Model No.

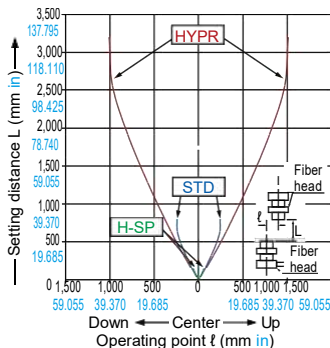
**FT-R41W**

Thru-beam type

Horizontal direction



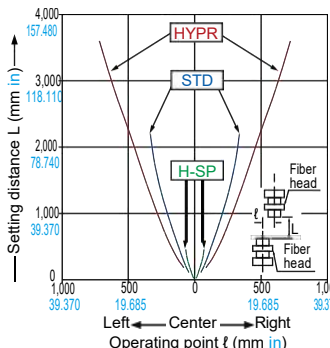
Vertical direction



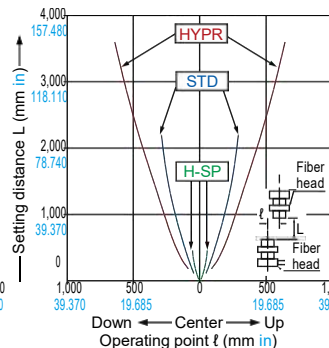
**FT-R42W**

Thru-beam type

Horizontal direction

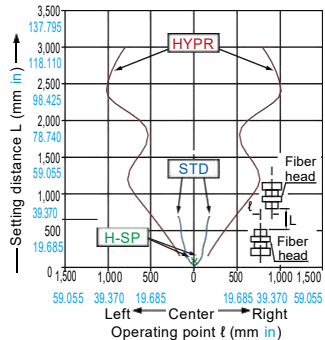


Vertical direction



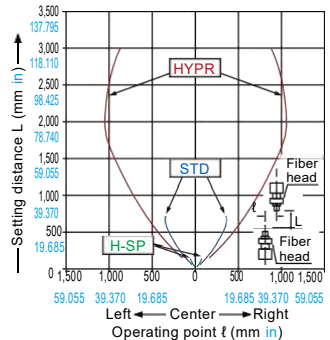
**FT-R43**

Thru-beam type



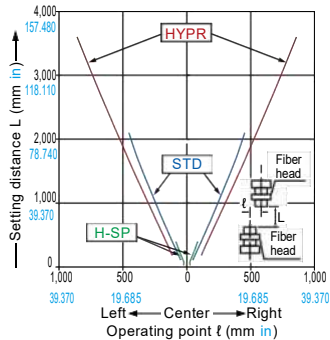
**FT-R44Y**

Thru-beam type



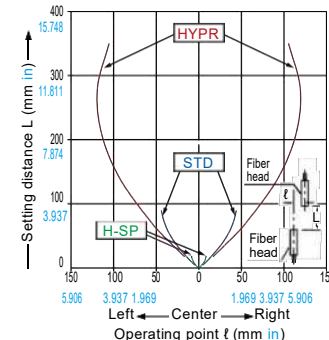
**FT-R60Y**

Thru-beam type



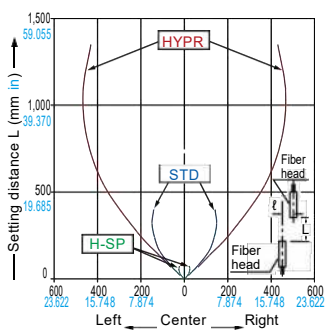
**FT-S11**

Thru-beam type



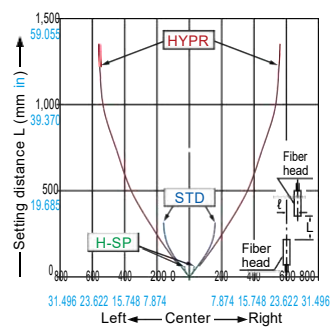
**FT-S20**

Thru-beam type



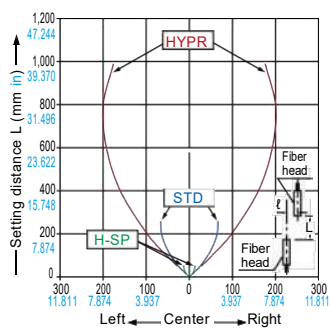
**FT-S21**

Thru-beam type



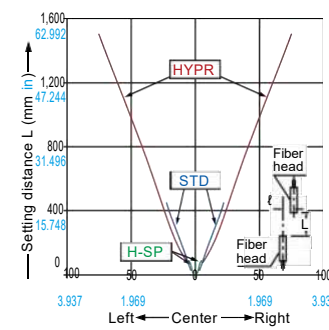
**FT-S21W**

Thru-beam type



**FT-S22**

Thru-beam type



**FT-S30**

Thru-beam type



**FT-S31W**

Thru-beam type



**FT-S32**

Thru-beam type



FIBER SENSORS

LASER SENSORS

PHOTO-ELECTRIC SENSORS

MICRO PHOTO-ELECTRIC SENSORS

AREA SENSORS

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PRESSURE / FLOW SENSORS

INDUCTIVE PROXIMITY SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASUREMENT SENSORS

STATIC CONTROL DEVICES

LASER MARKERS

PLC

HUMAN MACHINE INTERFACES

ENERGY MANAGEMENT SOLUTIONS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Selection Guide

Fibers

Fiber Amplifiers

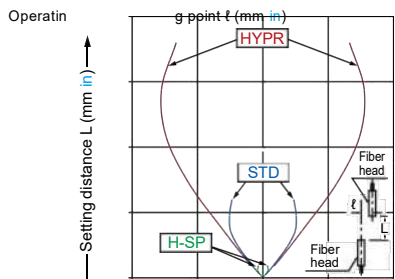
Other Products

**FX-500**

FX-550

FX-100

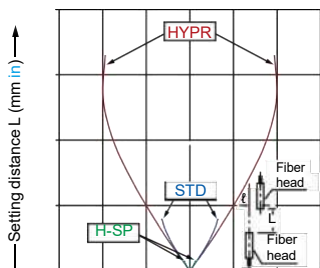
FX-410



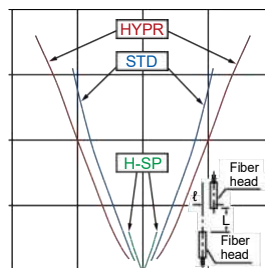
4,000

4,000

4,000



157,480



157,480

3,000

118,110

3,000

118.110

3.000

118.110













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1,500 1,000 500 1,000 1,500 0 1,000 500 0







Left Center Right

Left Center Right

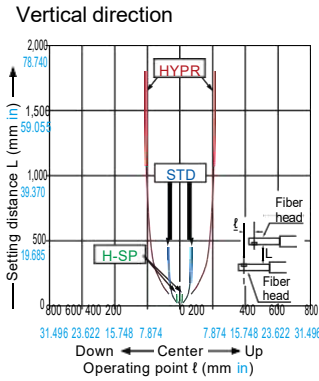
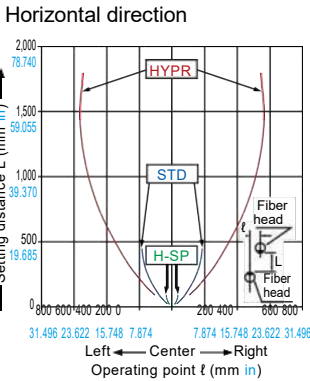
Left Center Right



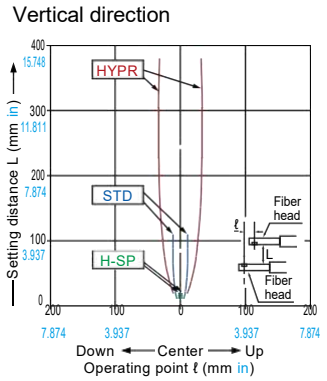
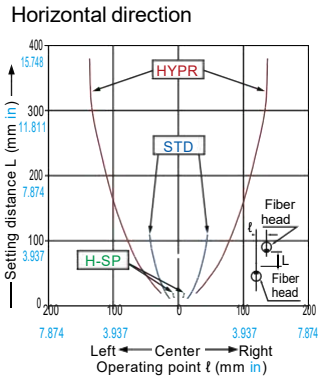
**SENSING CHARACTERISTICS (TYPICAL)**

**Thru-beam type Parallel deviation** Sensing characteristics are listed in the alphabetic order of Model No.

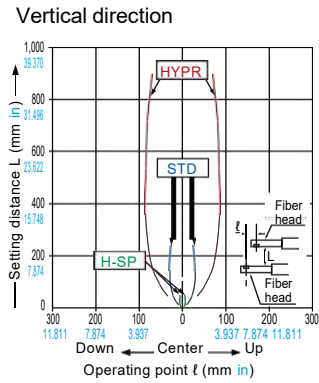
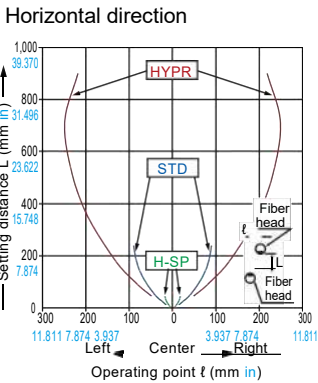
**FT-V23** Thru-beam type



**FT-V24W** Thru-beam type



**FT-V25** Thru-beam type



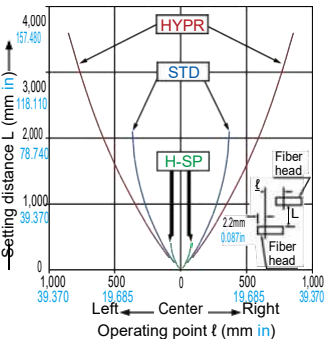
**SENSING CHARACTERISTICS (TYPICAL)**

**Thru-beam type Parallel deviation** Sensing characteristics are listed in the alphabetic order of Model No.

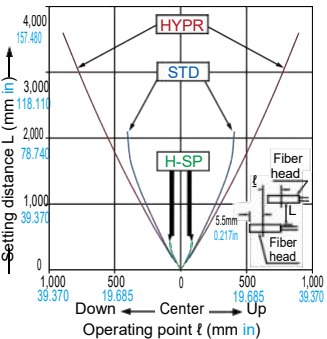
**FT-Z30**

Thru-beam type

Horizontal direction



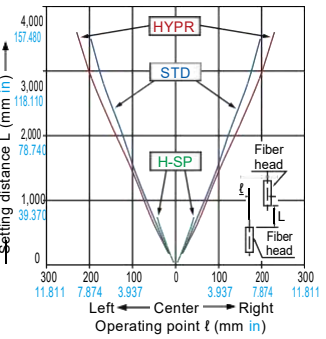
Vertical direction



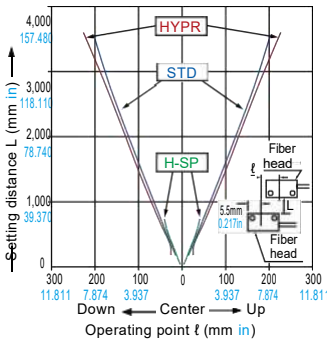
**FT-Z30E**

Thru-beam type

Horizontal direction



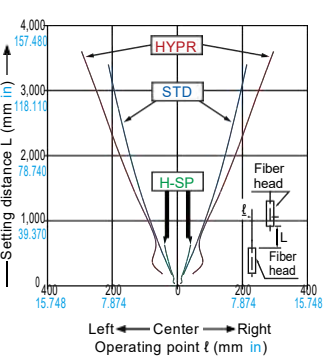
Vertical direction



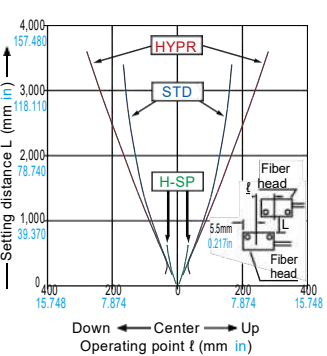
**FT-Z30EW**

Thru-beam type

Horizontal direction



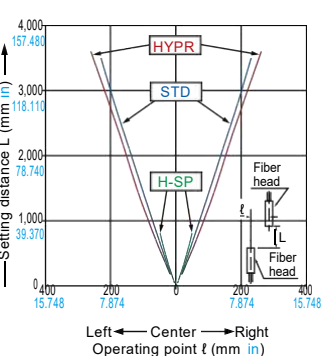
Vertical direction



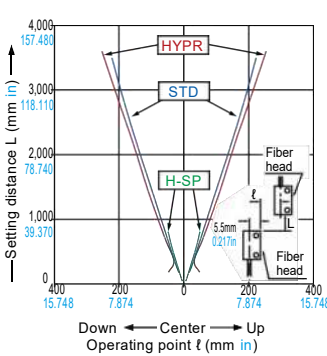
**FT-Z30H**

Thru-beam type

Horizontal direction



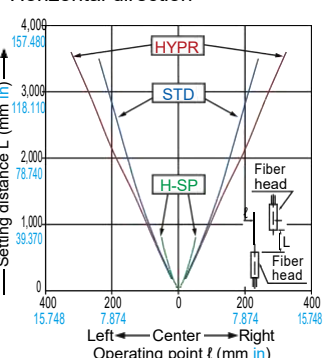
Vertical direction



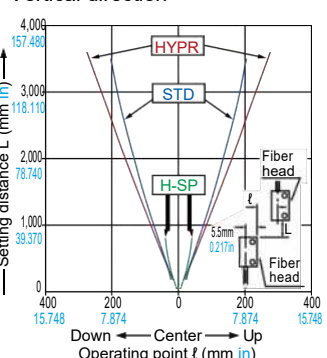
**FT-Z30HW**

Thru-beam type

Horizontal direction



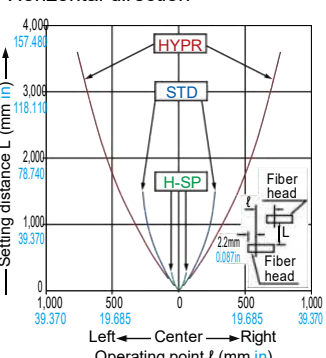
Vertical direction



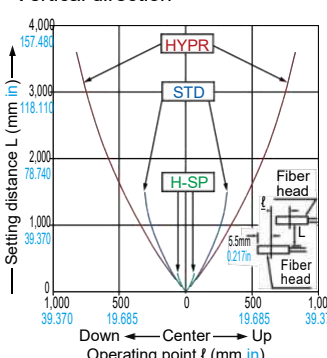
**FT-Z30W**

Thru-beam type

Horizontal direction



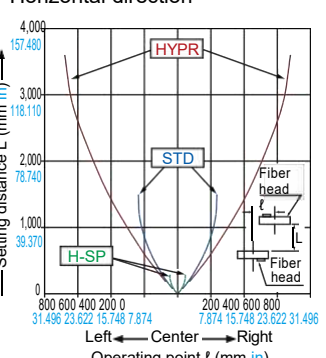
Vertical direction



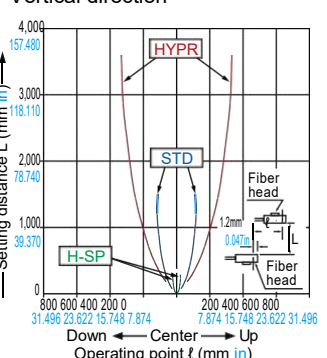
**FT-Z40W**

Thru-beam type

Horizontal direction



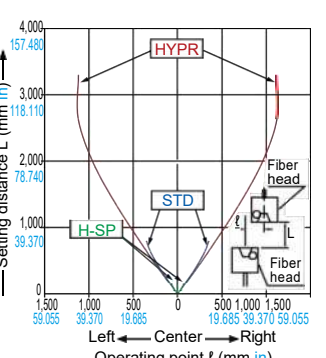
Vertical direction



**FT-Z40HBW**

Thru-beam type

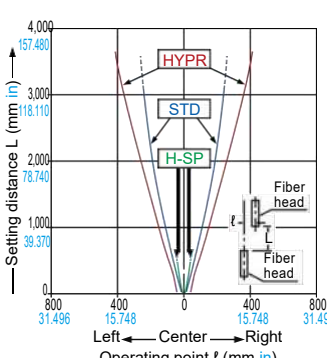
Horizontal direction



**FT-Z802Y**

Thru-beam type

Horizontal direction



FIBER SENSORS  
LASER SENSORS  
PHOTO-ELECTRIC SENSORS  
MICRO PHOTO-ELECTRIC SENSORS  
AREA SENSORS  
SAFETY 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 CONTROL DEVICES  
LASER MARKERS  
PLC  
HUMAN MACHINE INTERFACES  
ENERGY MANAGEMENT SOLUTIONS

FA COMPONENTS  
MACHINE VISION SYSTEMS  
UV CURING SYSTEMS  
Selection Guide  
Fibers  
Fiber Amplifiers  
Other Products

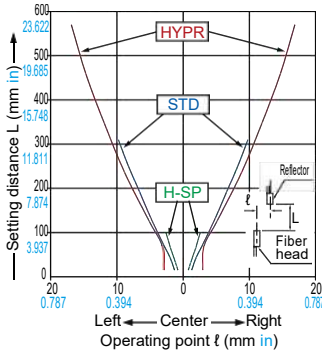
**FX-500**  
**FX-550**  
**FX-100**  
**FX-410**

**SENSING CHARACTERISTICS (TYPICAL)**

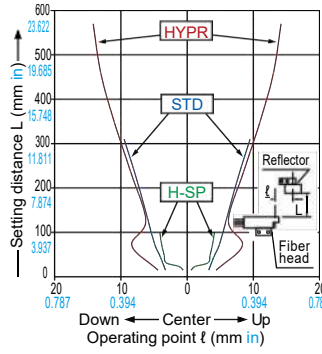
**Retroreflective type Parallel deviation** Sensing characteristics are listed in the alphabetic order of the Model No.

**FR-KZ22E** Retroreflective type

Horizontal direction

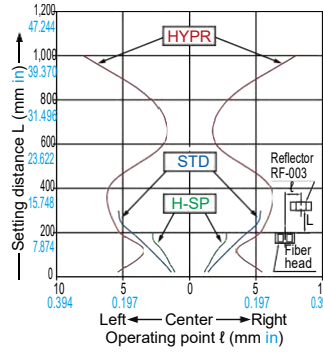


Vertical direction

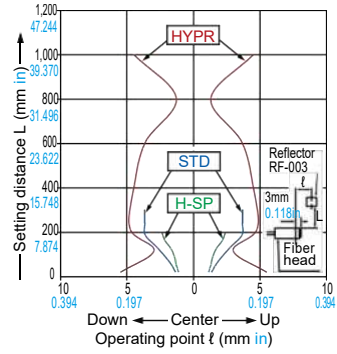


**FR-KZ50E** Retroreflective type

Horizontal direction

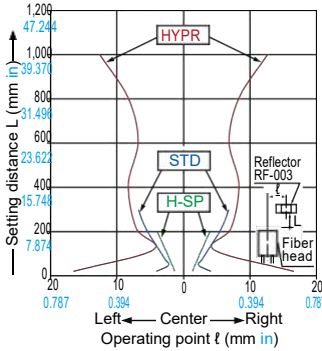


Vertical direction

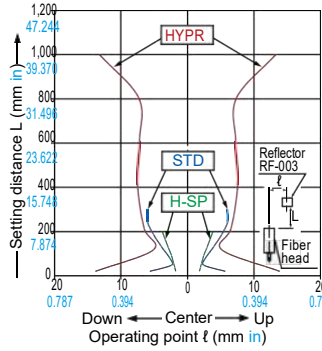


**FR-KZ50H** Retroreflective type

Horizontal direction



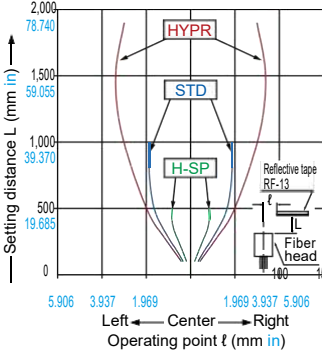
Vertical direction



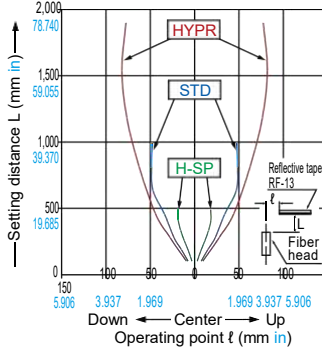
**FR-Z50HW** Retroreflective type

With reflective tape **RF-13** (attached)

Horizontal direction

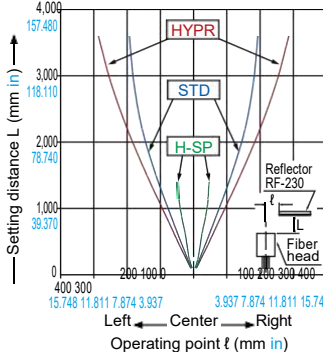


Vertical direction

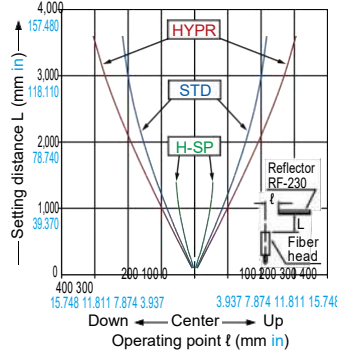


With reflector **RF-230** (optional)

Horizontal direction



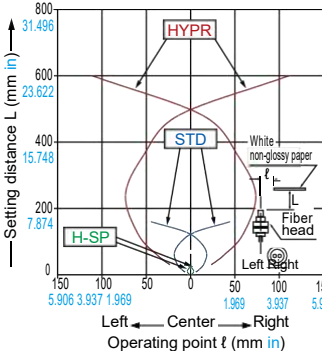
Vertical direction



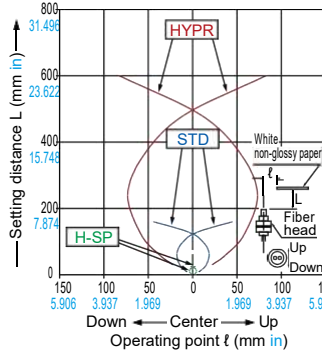
**Reflective type Sensing field** Sensing characteristics are listed in the alphabetic order of the Model No.

**FD-30** Reflective type

Horizontal direction

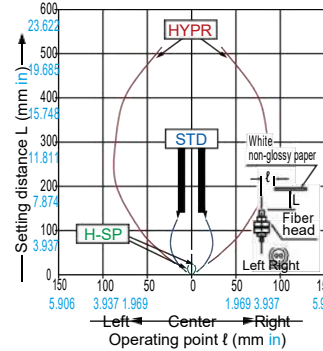


Vertical direction

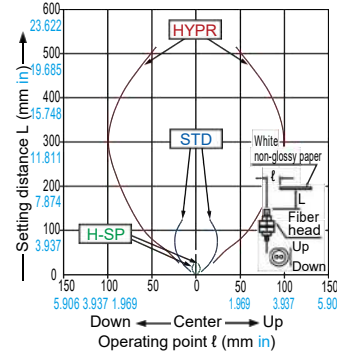


**FD-31** Reflective type

Horizontal direction



Vertical direction



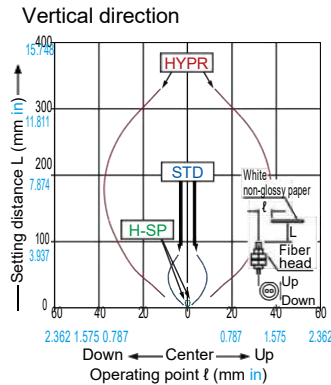
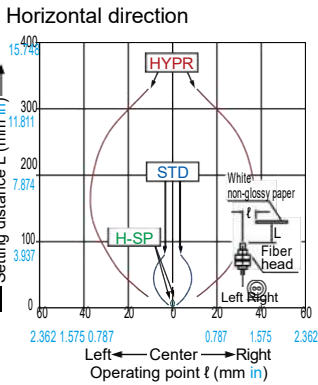
- FIBER SENSORS
- LASER SENSORS
- PHOTO-ELECTRIC SENSORS
- MICRO PHOTO-ELECTRIC SENSORS
- AREA SENSORS
- SAFETY LIGHT CURTAINS / SAFETY COMPONENTS
- PRESSURE / FLOW SENSORS
- INDUCTIVE PROXIMITY SENSORS
- PARTICULAR USE SENSORS
- SENSOR OPTIONS
- SIMPLE WIRE-SAVING UNITS
- WIRE-SAVING SYSTEMS
- MEASUREMENT SENSORS
- STATIC CONTROL DEVICES
- LASER MARKERS
- PLC
- HUMAN MACHINE INTERFACES
- ENERGY MANAGEMENT SOLUTIONS
- FA COMPONENTS
- MACHINE VISION SYSTEMS
- UV CURING SYSTEMS
- Selection Guide
- Fibers
- Fiber Amplifiers
- Other Products
- FX-500**
- FX-550**
- FX-100**
- FX-410**

**SENSING CHARACTERISTICS (TYPICAL)**

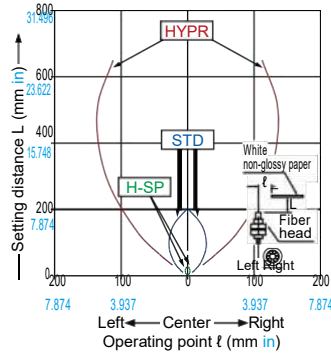
**Reflectivetype Sensing field** Sensing characteristics are listed in the alphabetic order of the Model No. (Models with same sensing characteristics are grouped together.)

- FIBER SENSORS
- LASER SENSORS
- PHOTO-ELECTRIC SENSORS
- MICRO PHOTO-ELECTRIC SENSORS
- AREA SENSORS
- SAFETY 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 CONTROL DEVICES
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- PLC
- HUMAN MACHINE INTERFACES
- ENERGY MANAGEMENT SOLUTIONS
- FA COMPONENTS
- MACHINE VISION SYSTEMS
- UV CURING SYSTEMS
- Selection Guide
- Fibers
- Fiber Amplifiers
- Other Products
- FX-500**
- FX-550**
- FX-100**
- FX-410**

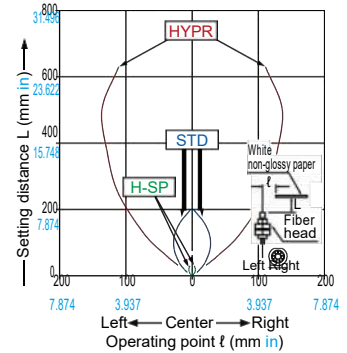
**FD-31W** Reflective type



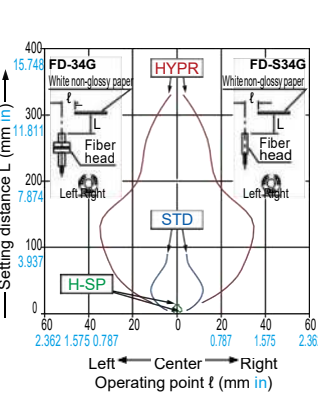
**FD-32G** Reflective type



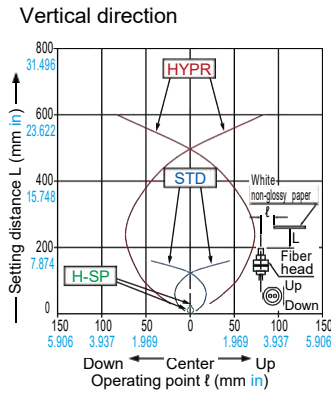
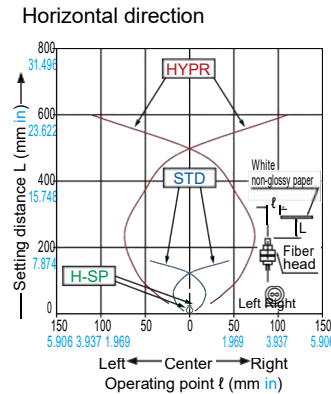
**FD-32GX** Reflective type



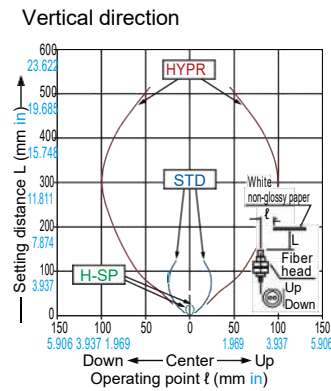
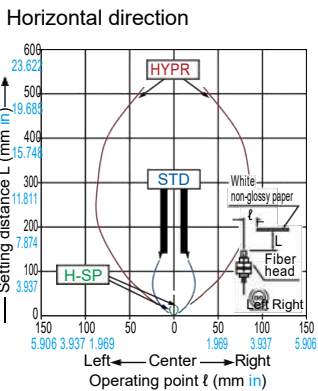
**FD-34G FD-S34G** Reflective type



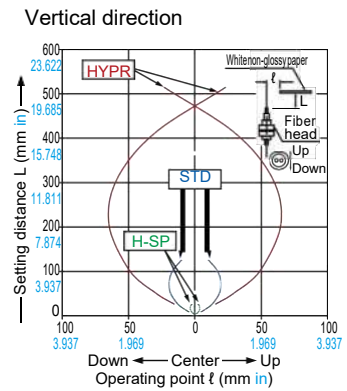
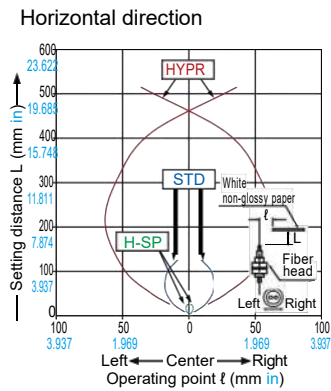
**FD-40** Reflective type



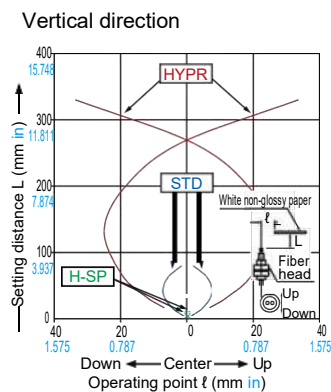
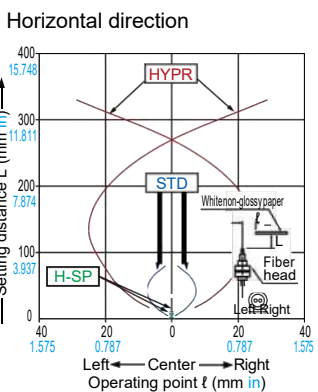
**FD-41** Reflective type



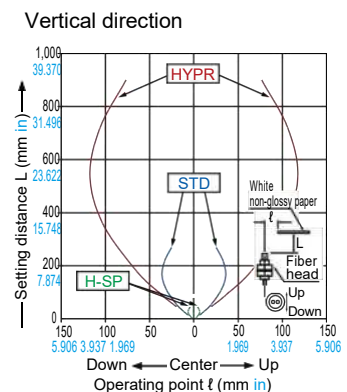
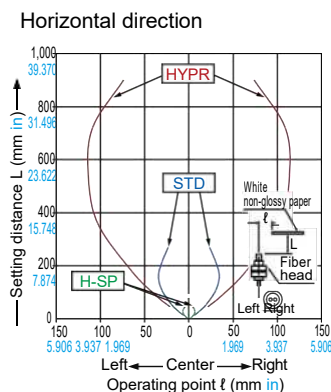
**FD-41S** Reflective type



**FD-41SW** Reflective type



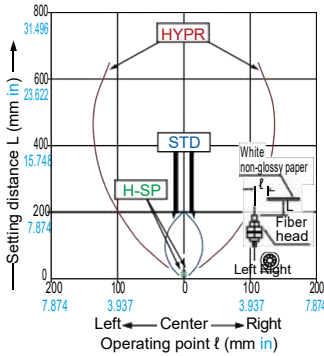
**FD-41W** Reflective type



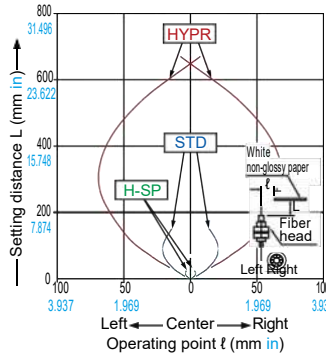
**SENSING CHARACTERISTICS (TYPICAL)**

**Reflective type Sensing field** Sensing characteristics are listed in the alphabetic order of the Model No.

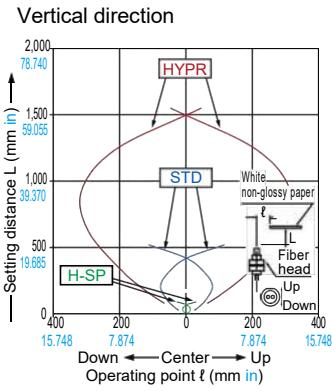
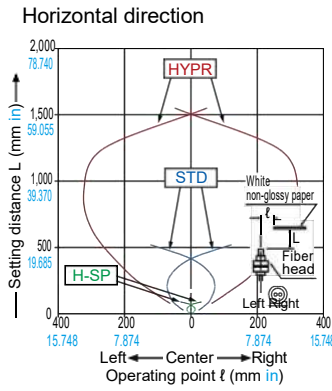
**FD-42G** Reflective type



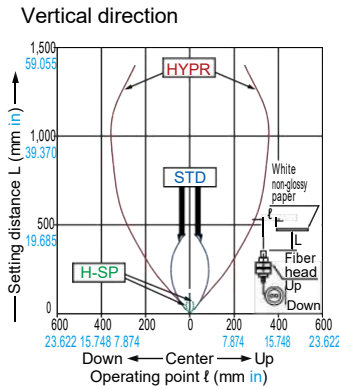
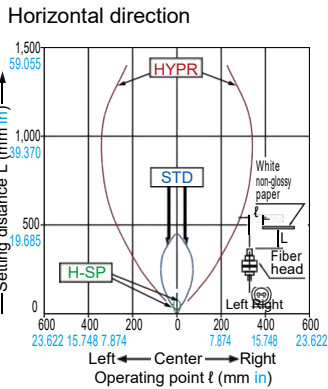
**FD-42GW** Reflective type



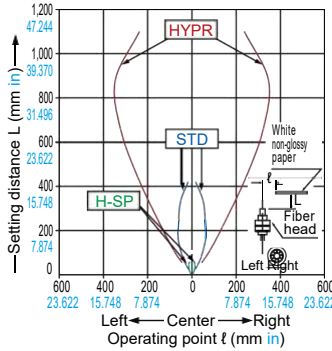
**FD-60** Reflective type



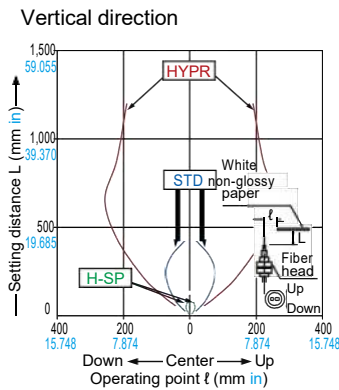
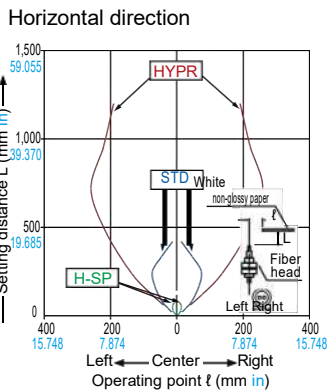
**FD-61** Reflective type



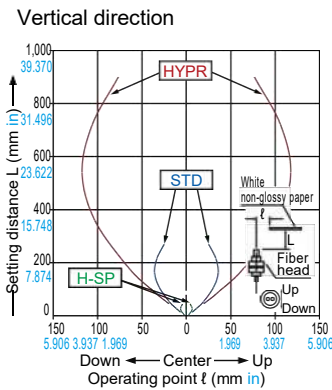
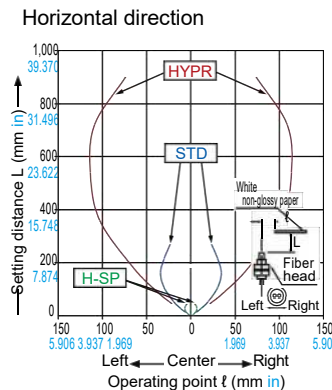
**FD-61G** Reflective type



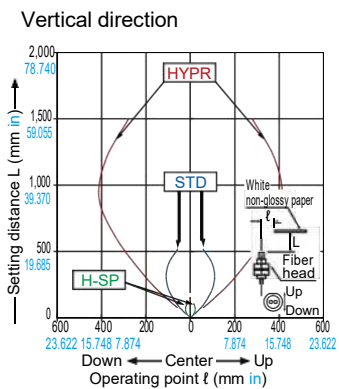
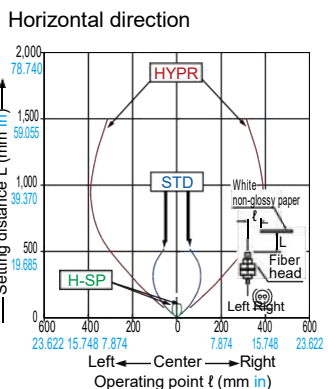
**FD-61S** Reflective type



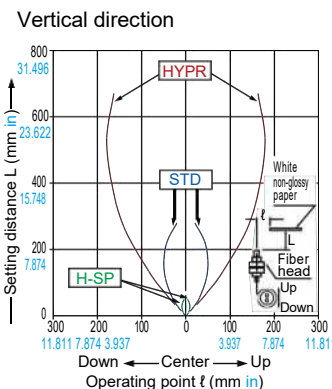
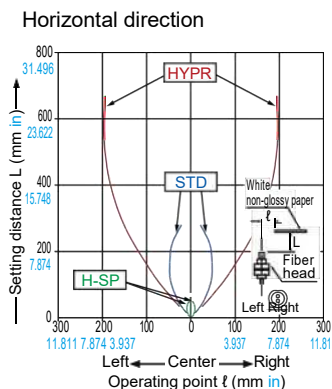
**FD-61W** Reflective type



**FD-62** Reflective type



**FD-64X** Reflective type



FIBER SENSORS

LASER SENSORS

PHOTO-ELECTRIC SENSORS

MICRO PHOTO-ELECTRIC SENSORS

AREA SENSORS

SAFETY 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 CONTROL DEVICES

LASER MARKERS

PLC

HUMAN MACHINE INTERFACES

ENERGY MANAGEMENT SOLUTIONS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Selection Guide

Fibers

Fiber Amplifiers

Other Products

**FX-500**

**FX-550**

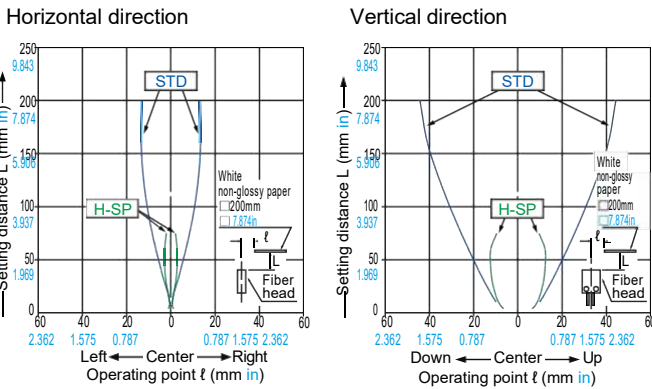
**FX-100**

**FX-410**

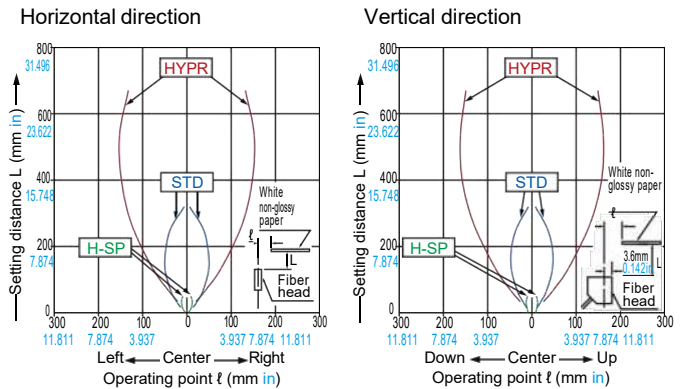
**SENSING CHARACTERISTICS (TYPICAL)**

**Reflective type Sensing field** Sensing characteristics are listed in the alphabetic order of the Model No.

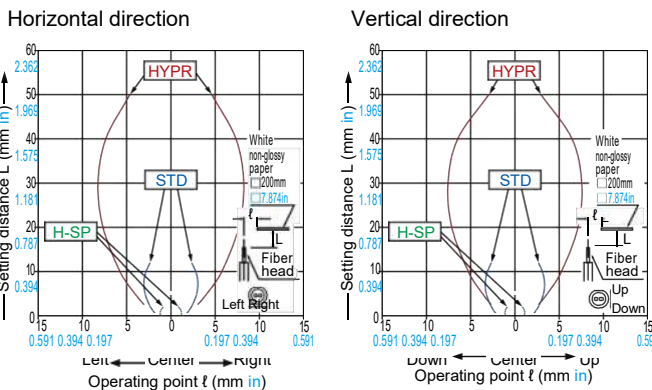
**FD-A16** Reflective type



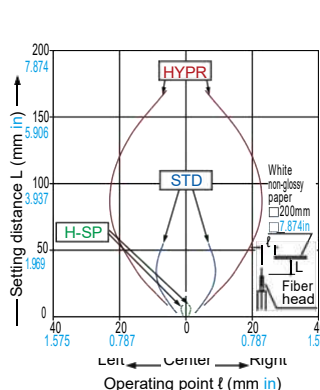
**FD-AL11** Reflective type



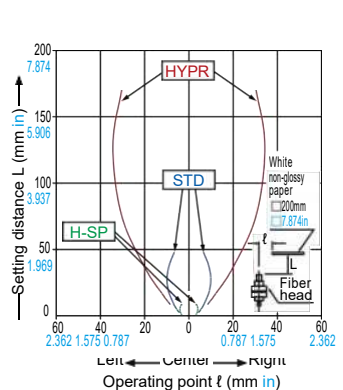
**FD-E13** Reflective type



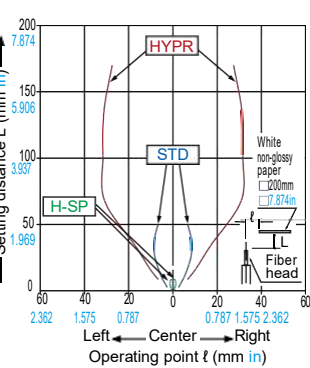
**FD-E23** Reflective type



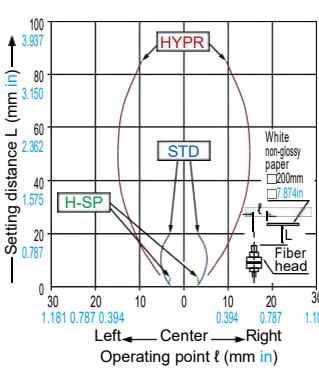
**FD-EG30** Reflective type



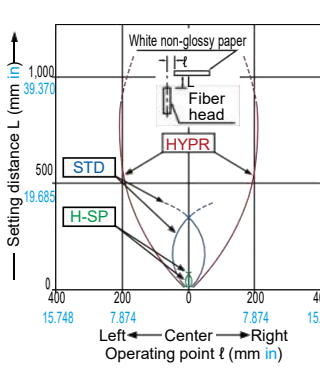
**FD-EG30S** Reflective type



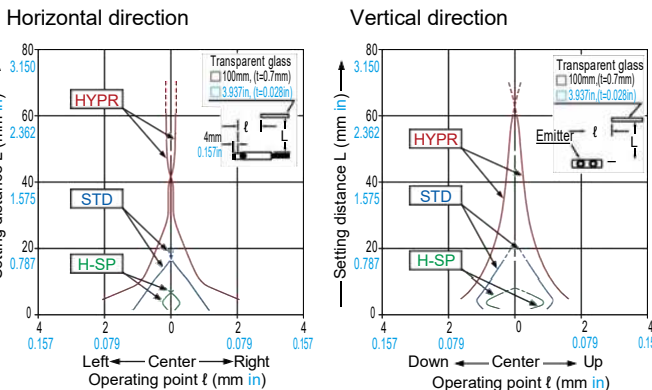
**FD-EG31** Reflective type



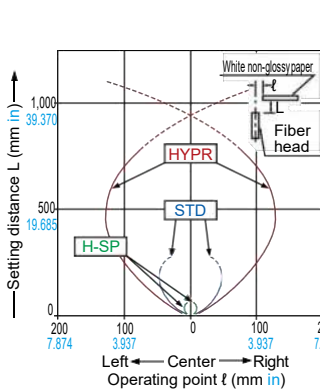
**FD-H13-FM2** Reflective type



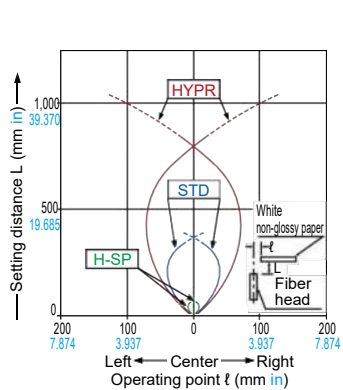
**FD-H18-L31** Reflective type



**FD-H20-21** Reflective type



**FD-H20-M1** Reflective type



- FIBER SENSORS
- LASER SENSORS
- PHOTO-ELECTRIC SENSORS
- MICRO PHOTO-ELECTRIC SENSORS
- AREA SENSORS SAFETY 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 CONTROL DEVICES
- LASER MARKERS
- PLC
- HUMAN MACHINE INTERFACES
- ENERGY MANAGEMENT SOLUTIONS
- FA COMPONENTS
- MACHINE VISION SYSTEMS
- UV CURING SYSTEMS
- Selection Guide
- Fibers
- Fiber Amplifiers
- Other Products

**FX-500**

**FX-550**

**FX-100**

**FX-410**



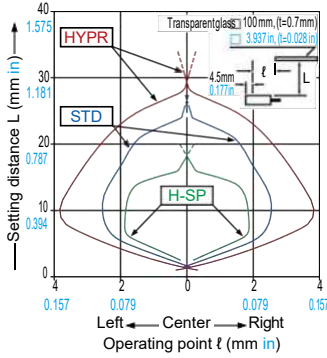
**SENSING CHARACTERISTICS (TYPICAL)**

**Reflective type Sensing field** Sensing characteristics are listed in the alphabetic order of the Model No. (Models with same sensing characteristics are grouped together.)

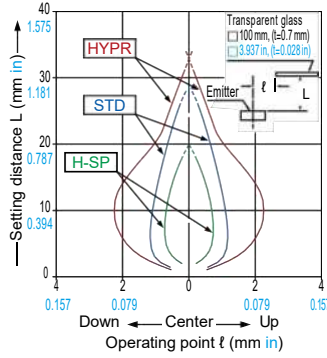
**FD-H25-L43**

Reflective type

Horizontal direction



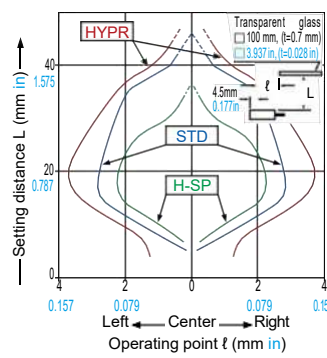
Vertical direction



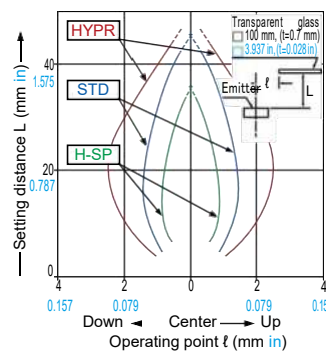
**FD-H25-L45**

Reflective type

Horizontal direction



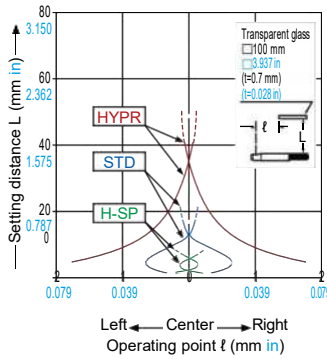
Vertical direction



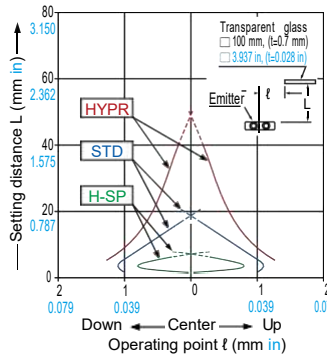
**FD-H30-L32**

Reflective type

Horizontal direction



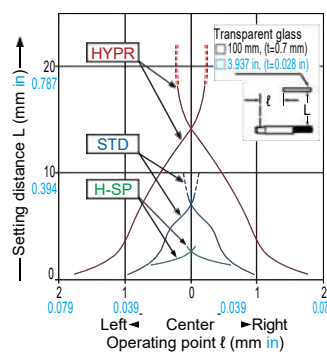
Vertical direction



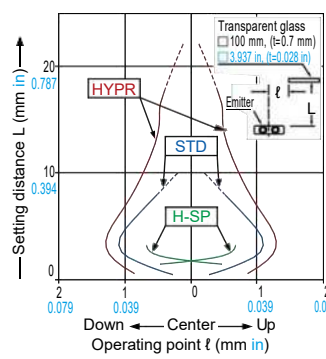
**FD-H30-L32V-S**

Reflective type

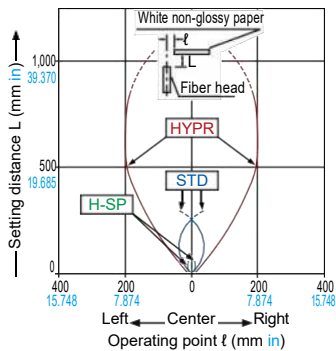
Horizontal direction



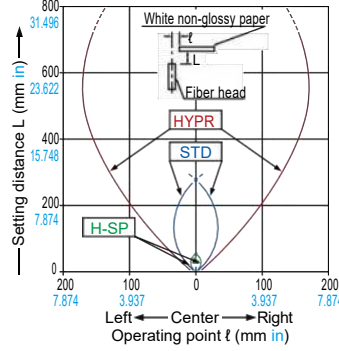
Vertical direction



**FD-H35-20S** Reflective type



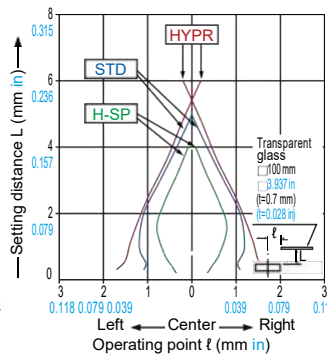
**FD-H35-M2**  
**FD-H35-M2S6** Reflective type



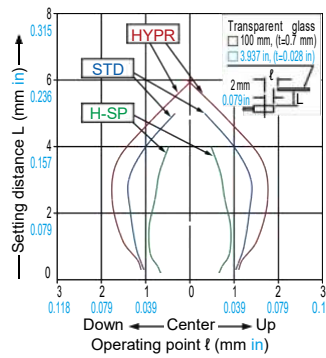
**FD-L10**

Reflective type

Horizontal direction



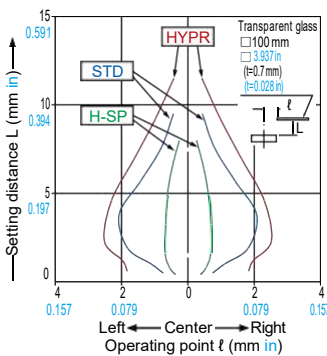
Vertical direction



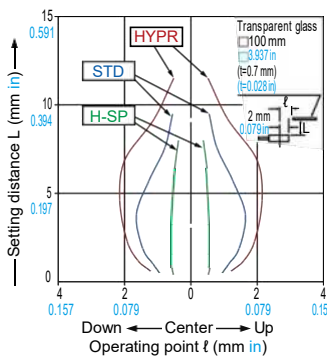
**FD-L11**

Reflective type

Horizontal direction



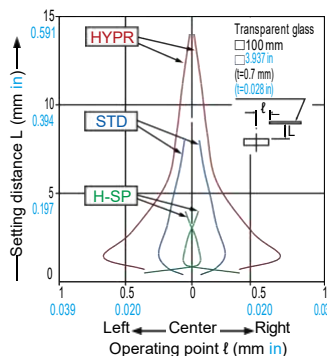
Vertical direction



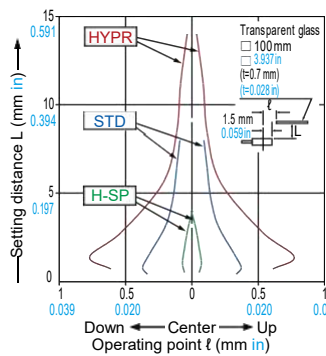
**FD-L12W**

Reflective type

Horizontal direction



Vertical direction



FIBER SENSORS

LASER SENSORS

PHOTO-ELECTRIC SENSORS

MICRO PHOTO-ELECTRIC SENSORS

AREA SENSORS

SAFETY 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 CONTROL DEVICES

LASER MARKERS

PLC

HUMAN MACHINE INTERFACES

ENERGY MANAGEMENT SOLUTIONS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Selection Guide

Fibers

Fiber Amplifiers

Other Products

**FX-500**

**FX-550**

**FX-100**

**FX-410**

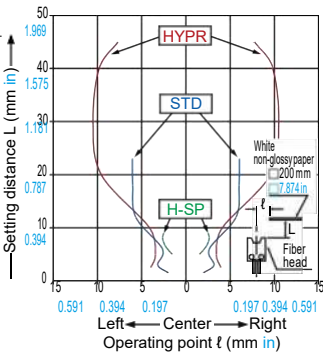
## SENSING CHARACTERISTICS (TYPICAL)

**Reflective type Sensing field** Sensing characteristics are listed in the alphabetic order of the Model No.

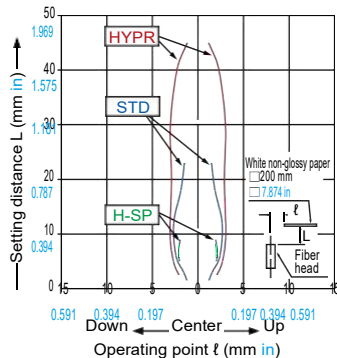
**FD-L20H**

Reflective type

Horizontal direction



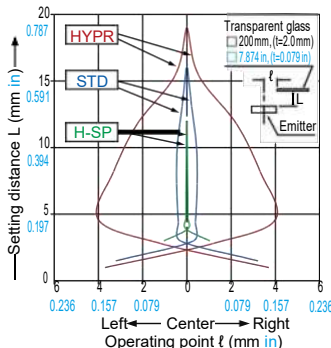
Vertical direction



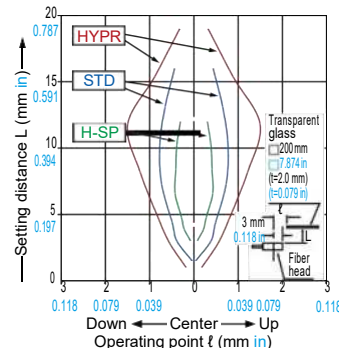
**FD-L21**

Reflective type

Horizontal direction



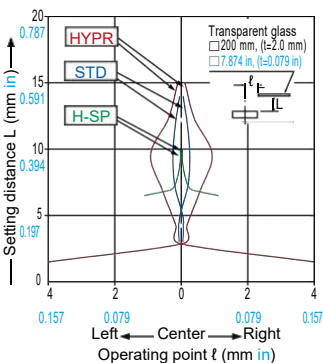
Vertical direction



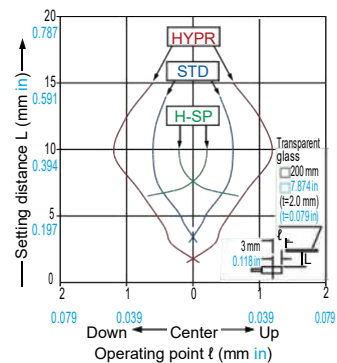
**FD-L21W**

Reflective type

Horizontal direction



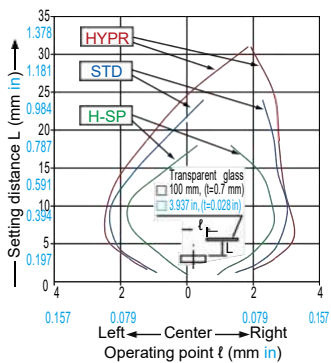
Vertical direction



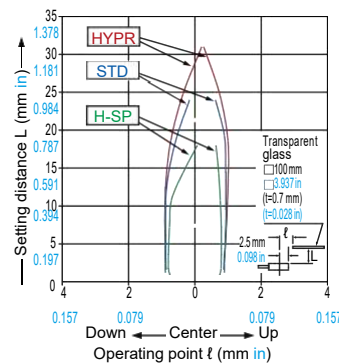
**FD-L22A**

Reflective type

Horizontal direction



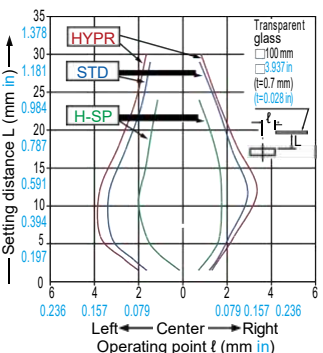
Vertical direction



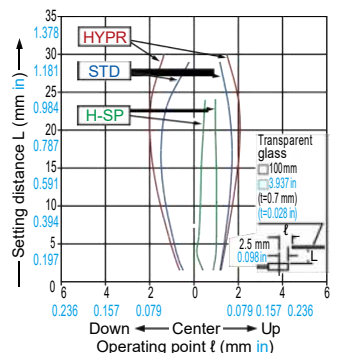
**FD-L23**

Reflective type

Horizontal direction



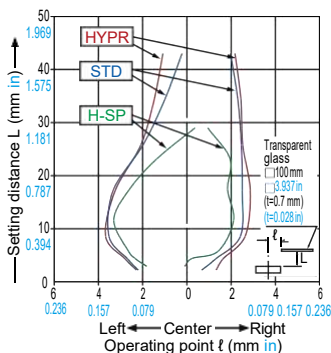
Vertical direction



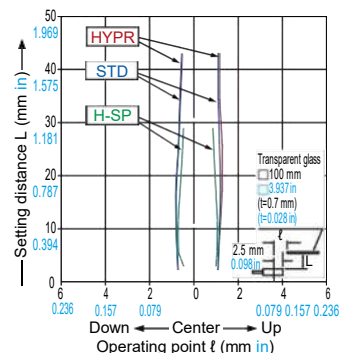
**FD-L30A**

Reflective type

Horizontal direction



Vertical direction



**FX-500**

**FX-550**

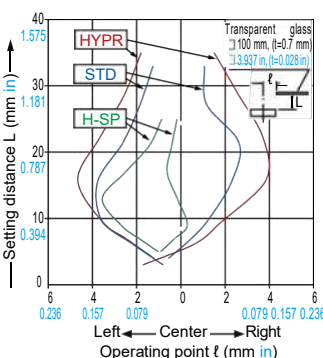
**FX-100**

**FX-410**

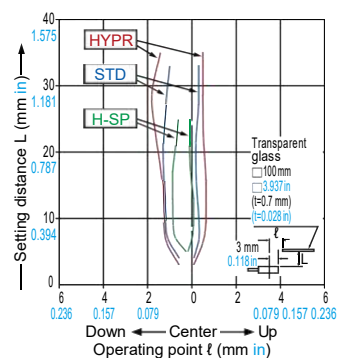
**FD-L31A**

Reflective type

Horizontal direction



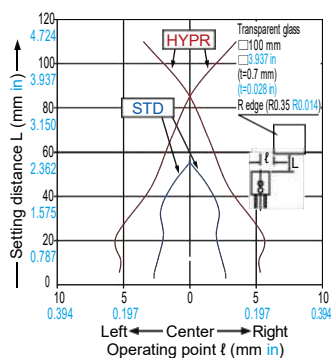
Vertical direction



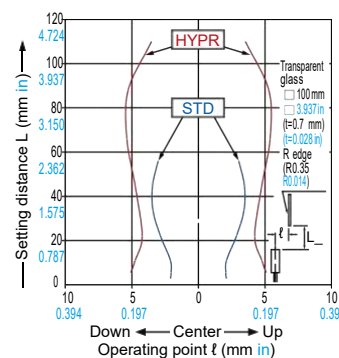
**FD-L32H**

Reflective type

Horizontal direction



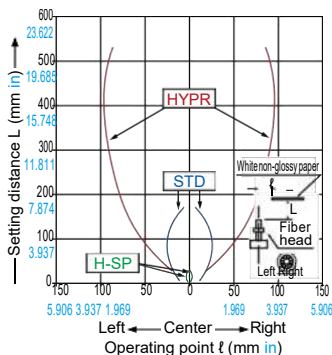
Vertical direction



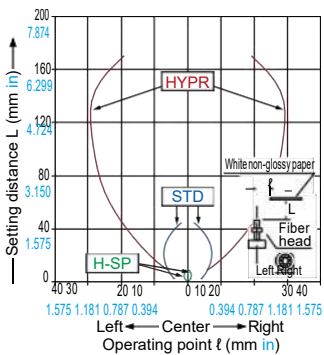
**SENSING CHARACTERISTICS (TYPICAL)**

**Reflective type Sensing field** Sensing characteristics are listed in the alphabetic order of the ModelNo.

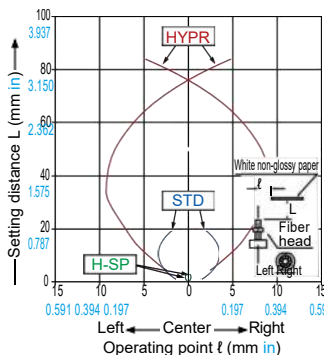
**FD-R31G** Reflective type



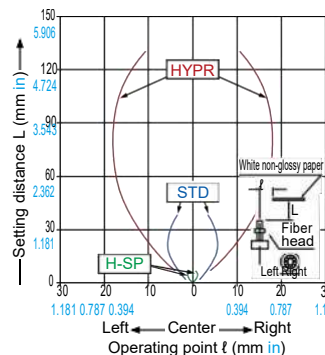
**FD-R32EG** Reflective type



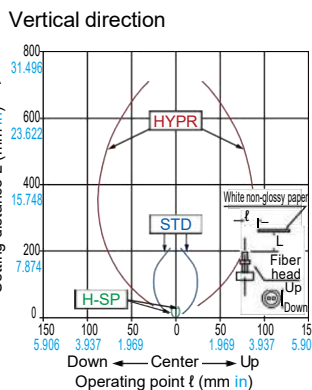
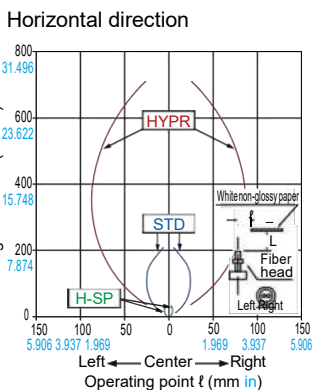
**FD-R33EG** Reflective type



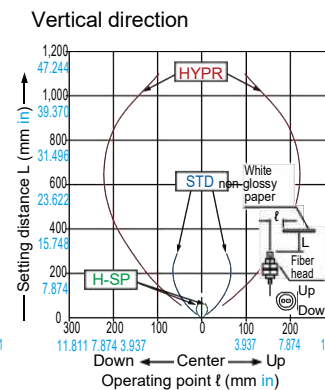
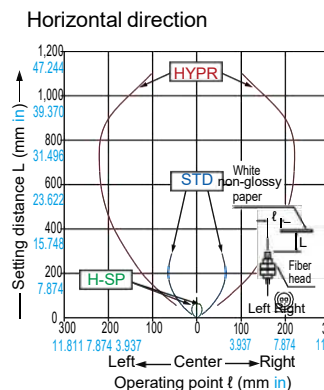
**FD-R34EG** Reflective type



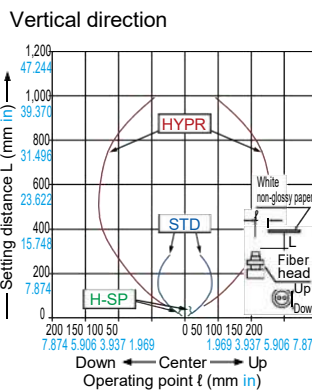
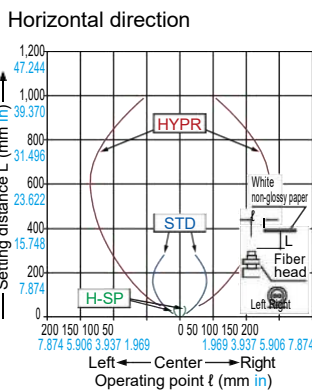
**FD-R41** Reflective type



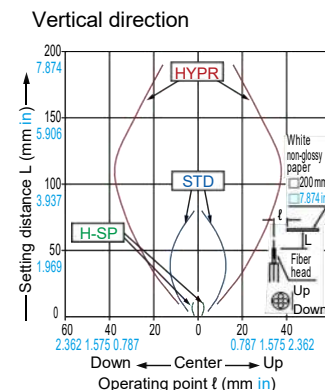
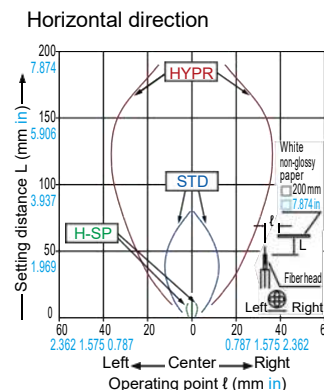
**FD-R60** Reflective type



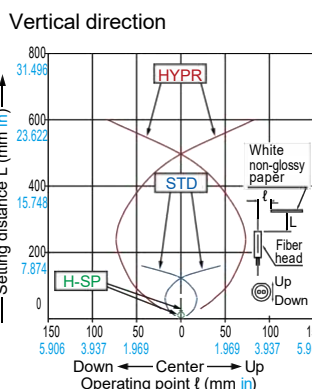
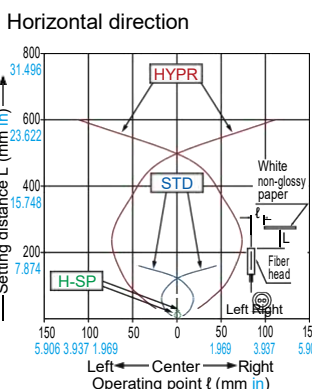
**FD-R61Y** Reflective type



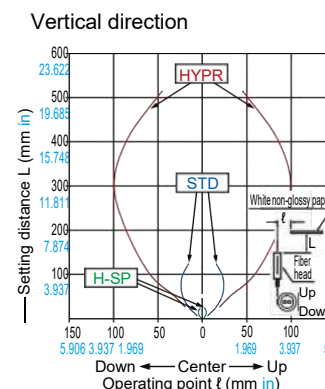
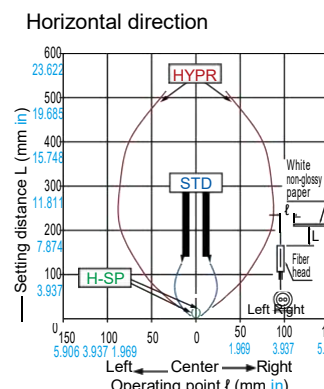
**FD-S21** Reflective type



**FD-S30** Reflective type



**FD-S31** Reflective type



FIBER SENSORS

LASER SENSORS

PHOTO-ELECTRIC SENSORS

MICRO PHOTO-ELECTRIC SENSORS

AREA SENSORS

SAFETY 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 CONTROL DEVICES

LASER MARKERS

PLC

HUMAN MACHINE INTERFACES

ENERGY MANAGEMENT SOLUTIONS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Selection Guide

Fibers

Fiber Amplifiers

Other Products

**FX-500**

**FX-550**

**FX-100**

**FX-410**

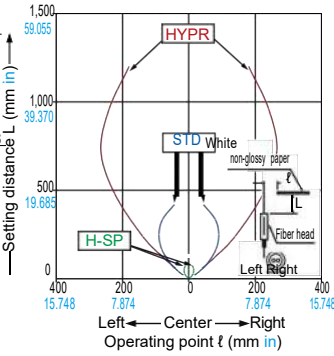
## SENSING CHARACTERISTICS (TYPICAL)

**Reflective type Sensing field** Sensing characteristics are listed in the alphabetic order of the Model No.

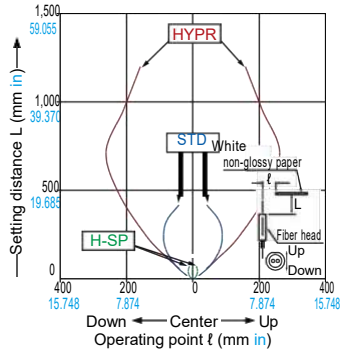
**FD-S32**

Reflective type

Horizontal direction



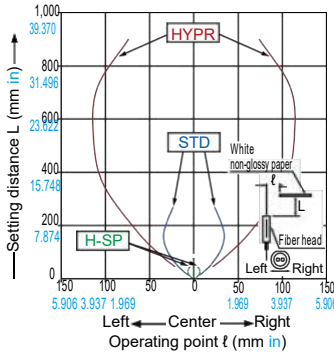
Vertical direction



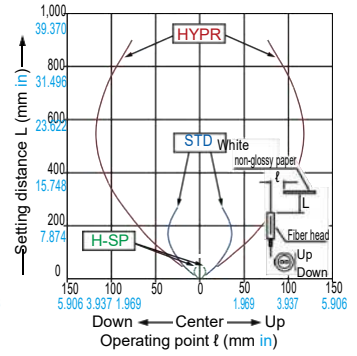
**FD-S32W**

Reflective type

Horizontal direction

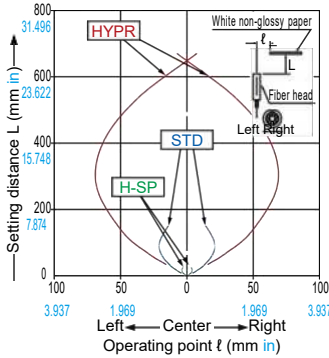


Vertical direction



**FD-S33GW**

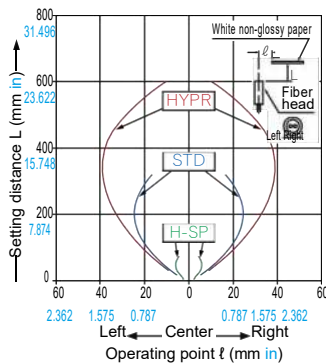
Reflective type



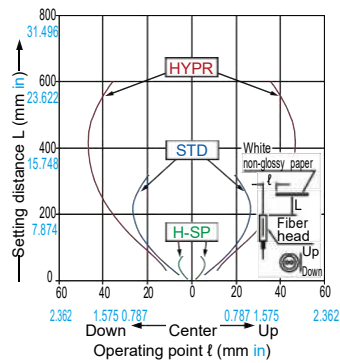
**FD-S60Y**

Reflective type

Horizontal direction



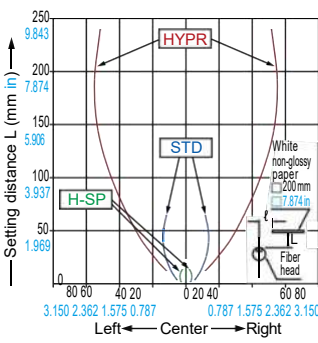
Vertical direction



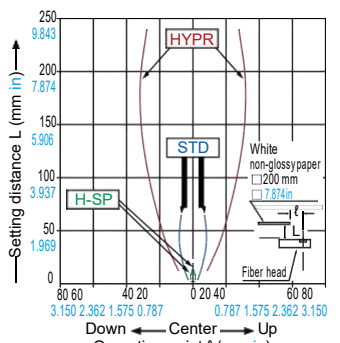
**FD-V30**

Reflective type

Horizontal direction



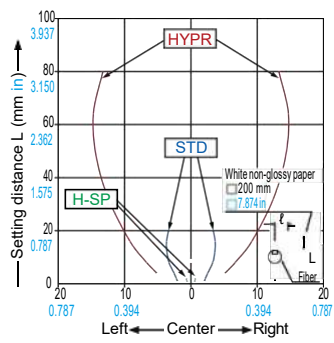
Vertical direction



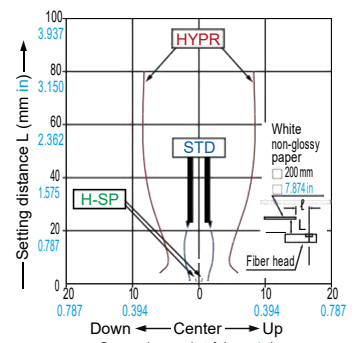
**FD-V30W**

Reflective type

Horizontal direction



Vertical direction



**FX-500**

**FX-550**

**FX-100**

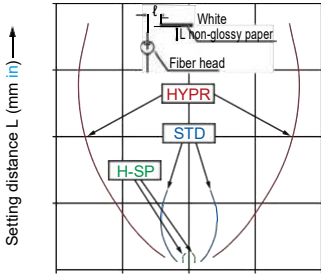
**FD-V50**

Reflective type

- FIBER SENSORS
- LASER SENSORS
- PHOTO-ELECTRIC SENSORS
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- COMPONENTS
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- INDUCTIVE PROXIMITY SENSORS
- PARTICULAR USE SENSORS
- SENSOR OPTIONS
- SIMPLE WIRE-SAVING UNITS
- WIRE-SAVING SYSTEMS
- MEASUREMENT SENSORS
- STATIC CONTROL DEVICES
- LASER MARKERS
- PLC
- HUMAN MACHINE INTERFACES
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- FA COMPONENTS
- MACHINE VISION SYSTEMS
- UV CURING SYSTEMS
- Selection Guide
- Fibers
- Fiber Amplifiers
- Other Products

Operati

ng point  $\ell$  (mm in)



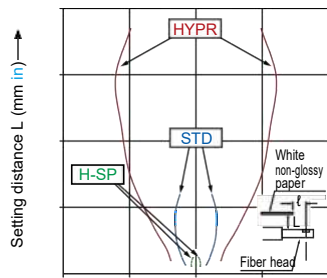
FX-410

Horizontal direction

Vertical direction

Horizontal direction

Vertical direction



11.811

15.748

15.748

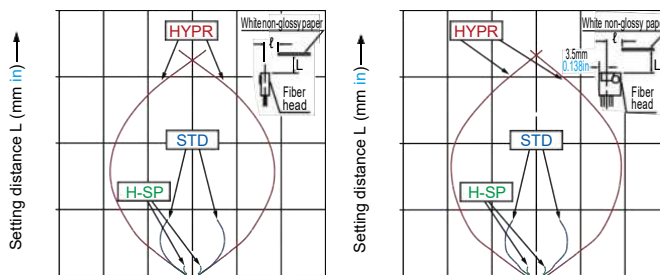
11.811

400

300

400

300



11.811

11.811

15.748

15.748





























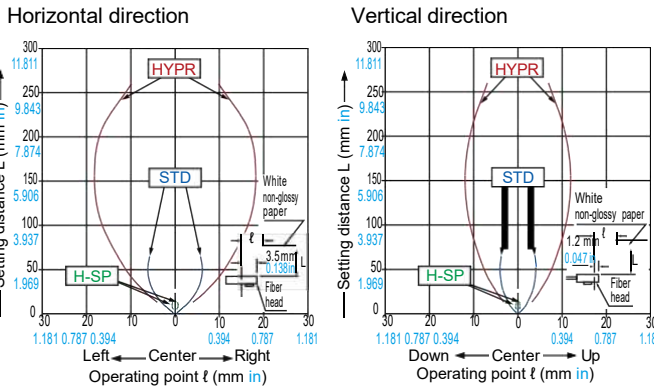




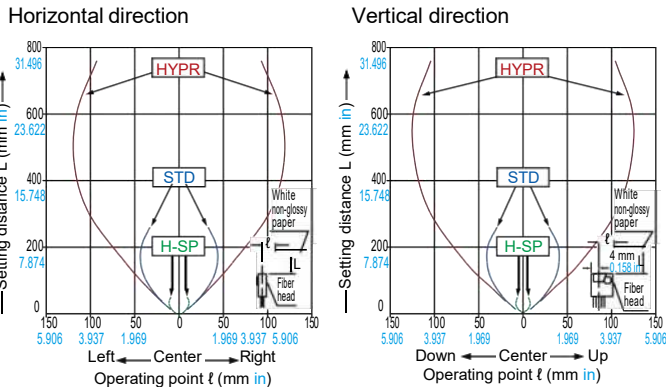
**SENSING CHARACTERISTICS (TYPICAL)**

**Reflective type Sensing field** Sensing characteristics are listed in the alphabetic order of the Model No.

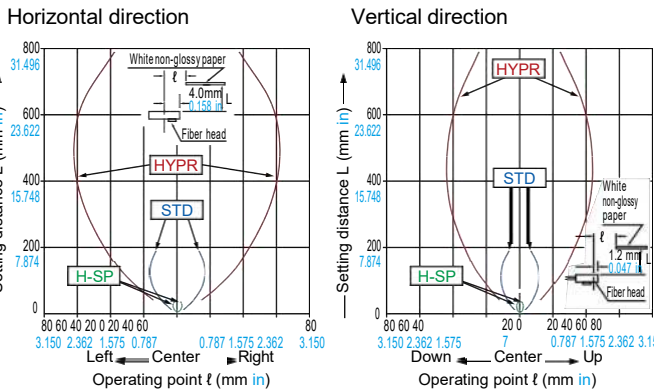
**FD-Z20W** Reflective type



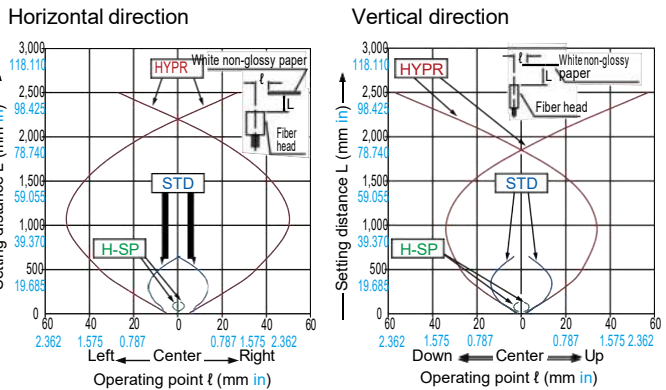
**FD-Z40HBW** Reflective type



**FD-Z40W** Reflective type



**FD-Z50HW** Reflective type



**PRECAUTIONS FOR PROPER USE**



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

**Wiring**

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

Refer to p.1552 ~ for general precautions.  
Refer to the "PRO mode operation manual" on our website for details.

**Others**

- 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 mm<sup>2</sup> or more, cable. However, in order to reduce noise, make the wiring as short as possible.
- Make sure that stress by forcible bending or pulling is not applied to the sensor cable joint and fiber cable.
- This product has been developed / produced for industrial use only.
- The specification may not be satisfied in a strong magnetic field.
- The ultra long distance (U-LG, HYPR) mode is more likely to be affected by extraneous noise since the sensitivity of that is higher than the other modes. Make sure to check the environment before use.
- Do not use during the initial transient time (H-SP, FAST, STD: 0.5 sec., LONG, U-LG, HYPR: 1 sec.) after the power supply is switched ON.
- These sensors are only for indoor use.
- Avoid dust, dirt, and steam.
- Make sure that the product does not come in contact with oil, grease, organic solvents such as thinner, etc., strong acid or alkaline.
- This product cannot be used in an environment containing inflammable or explosive gases.
- Never disassemble or modify this product.
- This product adopts EEPROM. Settings cannot be done a million times or more because of the EEPROM's lifetime.

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Fiber Amplifiers

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**FX-550**

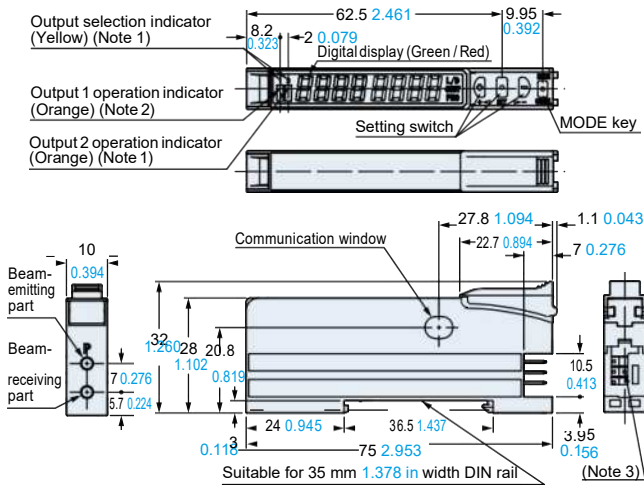
**FX-100**

**FX-410**

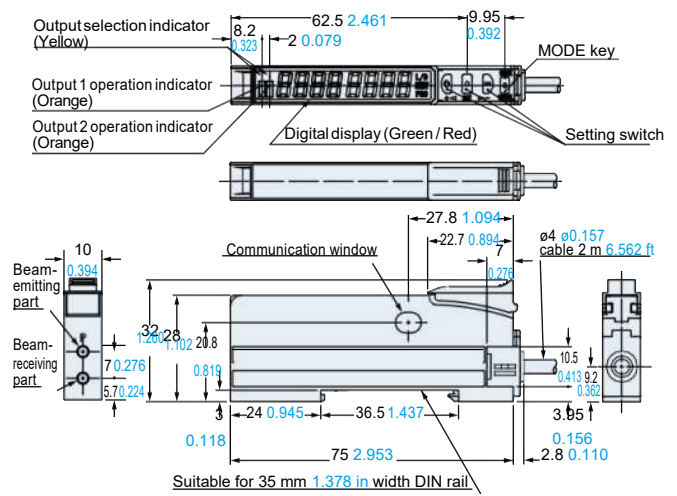
**DIMENSIONS (Unit: mm in)**

Refer to p.63~ for details of fiber dimensions.  
The CAD data can be downloaded from our website.

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



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

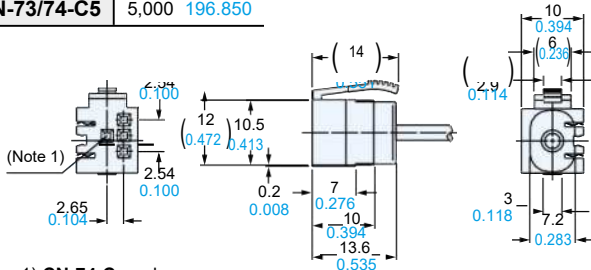
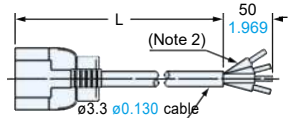


- Notes: 1) FX-502(P) only  
2) FX-501(P): Operation indicator  
3) FX-501(P): 3-pin, FX-502(P): 4-pin

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

• Length L

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

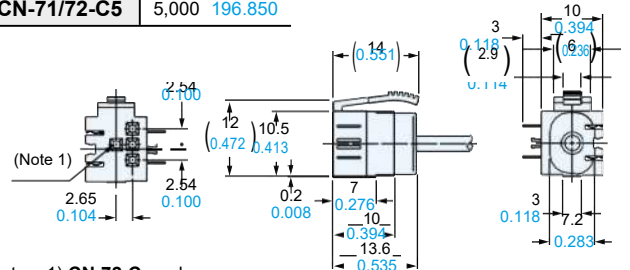
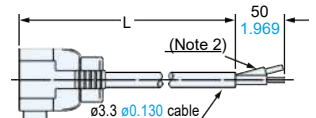


- Notes: 1) CN-74-C□ only  
2) CN-73-C□: 3-core

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

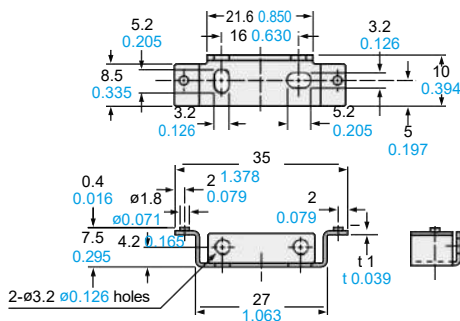
• Length L

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



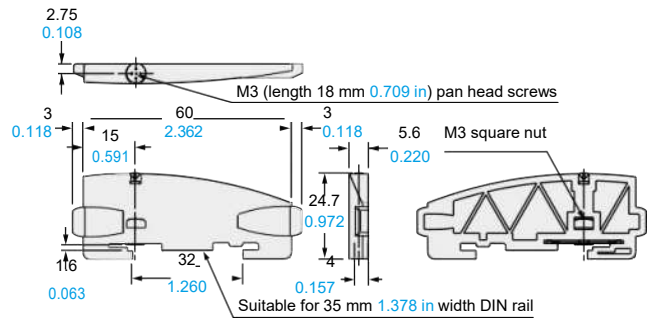
- Notes: 1) CN-72-C□ only  
2) CN-71-C□: 1-core

**MS-DIN-2** Amplifier mounting bracket (Optional)



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

**MS-DIN-E** End plate (Optional)



Material: Polycarbonate

MEMO

A large grid area for taking notes, consisting of many small squares. The grid is approximately 30 columns wide and 40 rows high, providing a structured space for handwritten or printed text.