

Digital Fiber Sensor

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
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- HUMAN MACHINE INTERFACES
- ENERGY MANAGEMENT SOLUTIONS
- FA COMPONENTS
- MACHINE VISION SYSTEMS
- UV CURING SYSTEMS

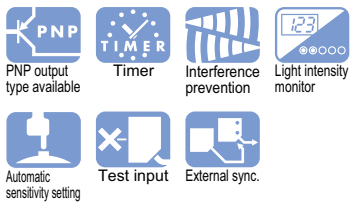
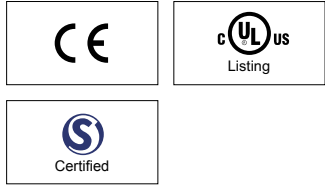
Related Information

- 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

Ver.2



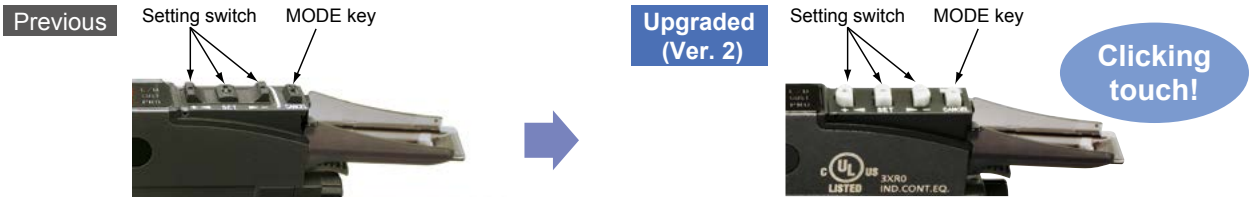
* There is no change in Model No. and price due to version upgrade.
 * Cover opened state is shown.



At the industry's leading edge

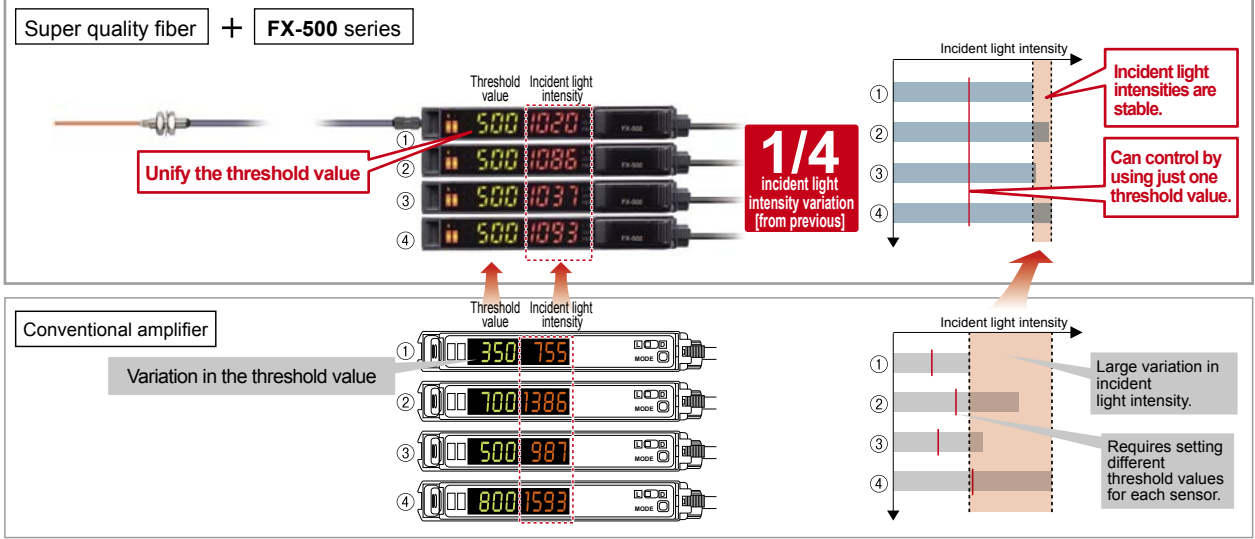
Improved the operability and visibility of the operation keys

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.



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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 $\downarrow \pm 10$

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 $R25\ \text{mm}$ $R0.984\ \text{in}$]

R4 mm
R0.157 in

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°

Max. 25 μs 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 **FX-301 (LONG mode)** **FD-NFM2**

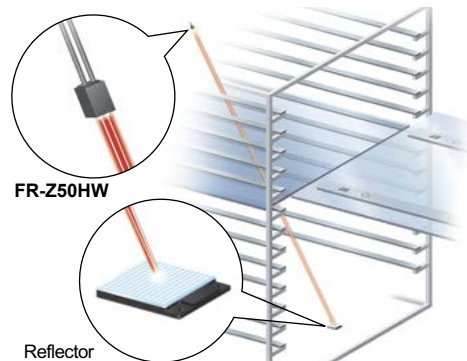
Max. 5.7 times! (Note) longer than the previous model

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

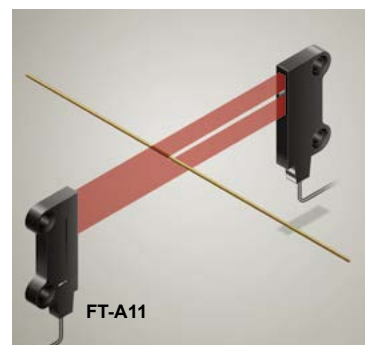
So accurate! Sharp detection with suppressed hysteresis

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**



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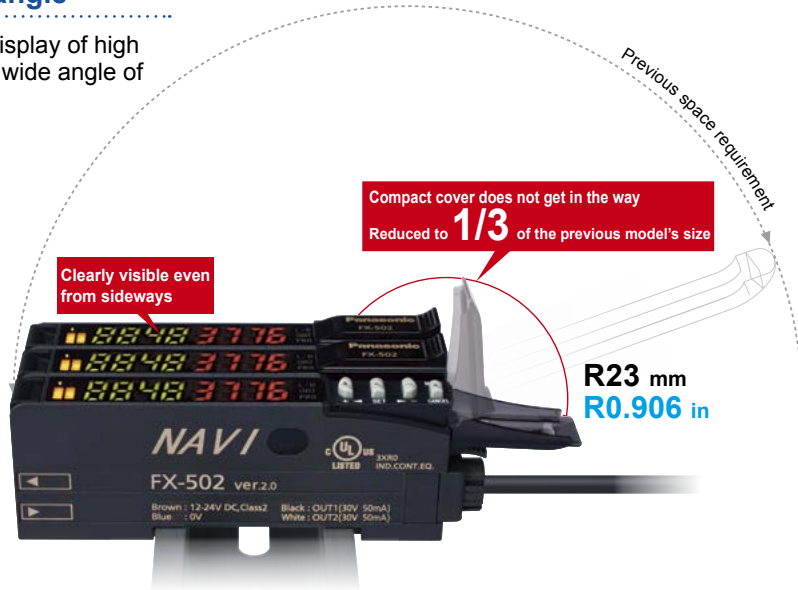
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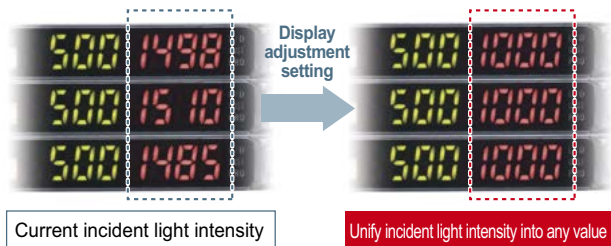
Flat display with wide viewing angle

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)

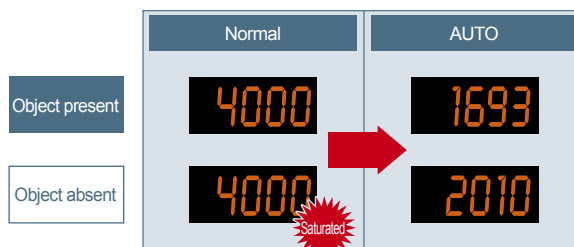


Self-diagnosis can be used with the threshold tracking function for added effectiveness.

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

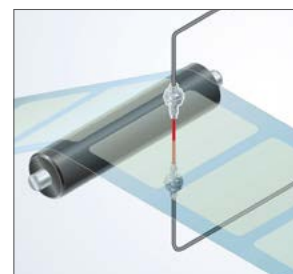


In cases when the incident light intensity is saturated, the light emitting amount can be adjusted to the optimal level by AUTO without changing the response time. This allows stable detection with an optimal S/N ratio and saves energy by controlling the emitting electric current.



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

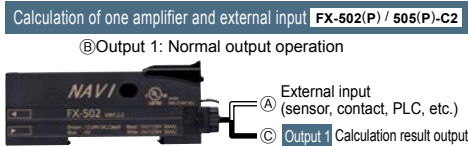
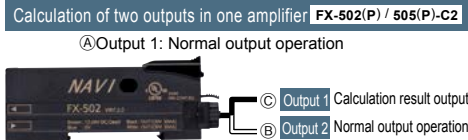
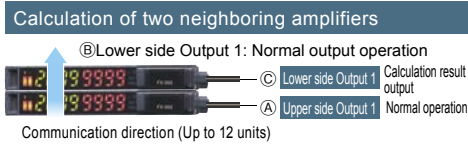
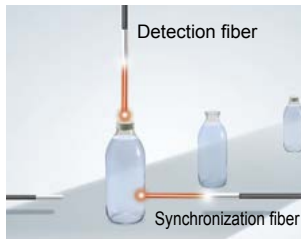
- Detecting a transparent sheet



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.

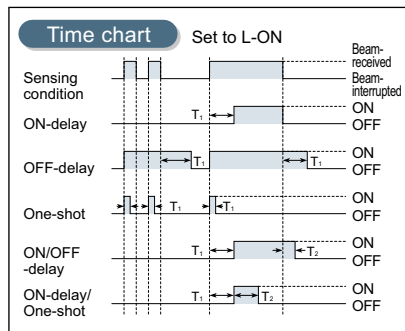


Truth table

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

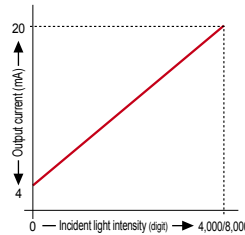
A wide variety of timer control operations can be carried out by fiber sensors only.



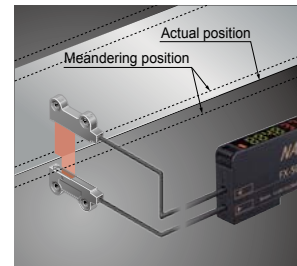
Timer period: 0.05 ms to 32 s
Output 1 has ON / OFF-delay and ON-delay / One-shot timers are available.

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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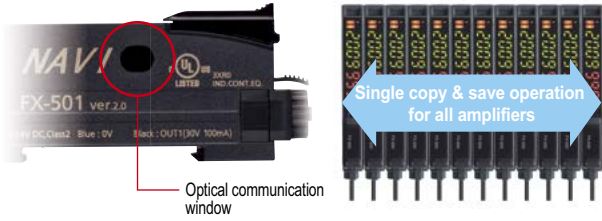
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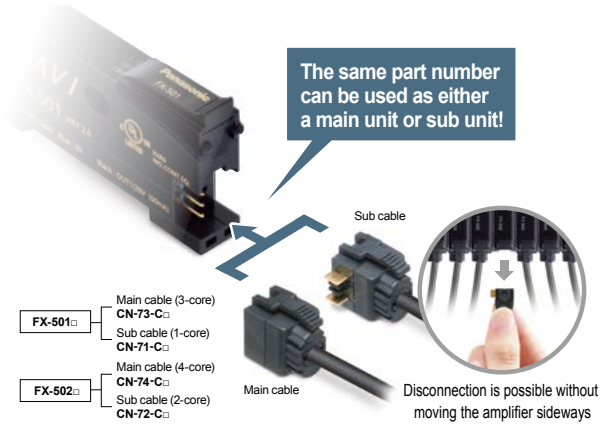
An optical communication function allows sensors to be adjusted simultaneously

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		FX-501	Red LED	NPN open-collector transistor	—
		FX-501P		PNP open-collector transistor	
2-output type		FX-502		NPN open-collector transistor 2 outputs	Incorporated (Switchable with Output 2)
		FX-502P		PNP open-collector transistor 2 outputs	
Cable type		FX-505-C2		NPN open-collector transistor 2 outputs analog output	Incorporated
		FX-505P-C2		PNP open-collector transistor 2 outputs analog output	

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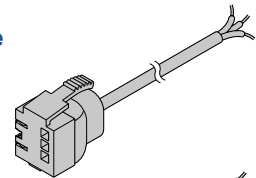
Quick-connection cables

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)	CN-73-C1	Length: 1 m 3.281 ft	0.2 mm ² 3-core cabtyre cable, with connector on one end Cable outer diameter: \varnothing 3.3 mm \varnothing 0.130 in
	CN-73-C2	Length: 2 m 6.562 ft	
	CN-73-C5	Length: 5 m 16.404 ft	
Sub cable (1-core)	CN-71-C1	Length: 1 m 3.281 ft	0.2 mm ² 1-core cabtyre cable, with connector on one end Cable outer diameter: \varnothing 3.3 mm \varnothing 0.130 in Connectable to a main cable up to 15 cables.
	CN-71-C2	Length: 2 m 6.562 ft	
	CN-71-C5	Length: 5 m 16.404 ft	

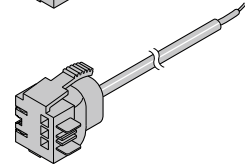
Main cable

- **CN-73-C**



Sub cable

- **CN-71-C**

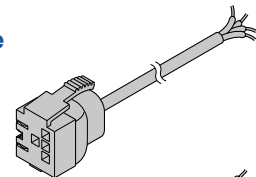


For FX-502(P) Quick-connection cable is not supplied with the amplifier. Please order it separately.

Type	Model No.	Length	Description
Main cable (4-core)	CN-74-C1	Length: 1 m 3.281 ft	0.2 mm ² 4-core cabtyre cable, with connector on one end Cable outer diameter: \varnothing 3.3 mm \varnothing 0.130 in
	CN-74-C2	Length: 2 m 6.562 ft	
	CN-74-C5	Length: 5 m 16.404 ft	
Sub cable (2-core)	CN-72-C1	Length: 1 m 3.281 ft	0.2 mm ² 2-core cabtyre cable, with connector on one end Cable outer diameter: \varnothing 3.3 mm \varnothing 0.130 in Connectable to a main cable up to 15 cables.
	CN-72-C2	Length: 2 m 6.562 ft	
	CN-72-C5	Length: 5 m 16.404 ft	

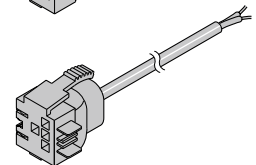
Main cable

- **CN-74-C**

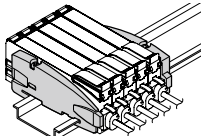


Sub cable

- **CN-72-C**



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

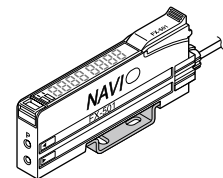
Appearance	Model No.	Description
	MS-DIN-E	When amplifiers are mounted in cascade, or when an amplifier moves depending on the way it is installed on a DIN rail, these end plates clamp amplifiers into place on both sides. Make sure to use end plates when cascading multiple amplifiers together. 2 pcs.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

OPTIONS

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

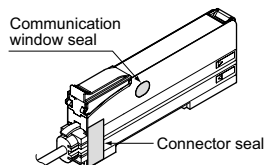
Amplifier mounting bracket

- **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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SPECIFICATIONS

Item	Model No.	Type	Standard type	2-output type	Cable type (Analog output type)		
		NPN output	FX-501	FX-502	FX-505-C2		
		PNP output	FX-501P	FX-502P	FX-505P-C2		
CE marking directive compliance		EMC Directive, RoHS Directive					
Supply voltage		12 to 24 V DC ⁺¹⁰ ₋₁₅ % Ripple P-P 10 % or less					
Power consumption		Normal operation: 960 mW or less (current consumption 40 mA or less at 24 V supply voltage, excluding analog output of cable type) ECO mode: 680 mW or less (current consumption 28 mA or less at 24 V supply voltage, excluding analog output of cable type)					
Output (2-output type and cable type: Output 1, Output 2)		<NPN output type> NPN open-collector transistor • Maximum sink current: 100 mA (2-output type and cable type are 50 mA) (Note 2) • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 2 V or less (Note 3) (at maximum sink current)		<PNP output type> PNP open-collector transistor • Maximum source current: 100 mA (2-output type and cable type are 50 mA) (Note 2) • Applied voltage: 30 V DC or less (between output and +V) • Residual voltage: 2 V or less (Note 3) (at maximum source current)			
		Output points		1 point		2 points	
		Output operation		Switchable either Light-ON or Dark-ON by L/D mode			
		Short-circuit protection		Incorporated			
Response time		H-SP: 25 μs or less, FAST: 60 μs or less, STD: 250 μs or less, LONG: 2 ms or less, U-LG: 4 ms or less, HYPR: 24 ms or less, selectable					
Analog output (Cable type only)		Output current: 4 to 20 mA approx. [H-SP, FAST, STD: At 0 to 4,000 digits, LONG: At 0 to 8,000 digits (Note 4)], Response time: 2 ms or less, Zero point: Within 4 mA ±1 % F.S., Span: Within 16 mA ±5 % F.S., Linearity: Within ±3 % F.S., Load resistance: 0 to 250 Ω					
External input (2-output type only, switchable with Output 2)		—————		<NPN output type> NPN non-contact input • Signal condition High: +8 V to +V DC or Open Low: 0 to +1.2 V DC (at 0.5 mA source current) • Input impedance: 10 kΩ approx.	<PNP output type> PNP non-contact input • Signal condition High: +4 V to +V DC (at 3 mA sink current) Low: 0 to +0.6 V DC or Open • Input impedance: 10 kΩ approx.		
Possible external input function		—————		Emission halt / Teaching (Full-auto, Limit, 2-point) / Logic operation setting / Copy lock / Display adjustment / Data bank load / Data bank save, selectable			
Sensitivity setting		2-point teaching / Limit teaching / Full-auto teaching / Manual adjustment					
Incident light intensity display range		H-SP / FAST / STD: 0 to 4,000, LONG: 0 to 8,000, U-LG / HYPR: 0 to 9,999					
Timer function		Incorporated with variable OFF-delay / ON-delay / One-shot / ON 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 ² 6-core cabtyre cable, 2 m 6.562 ft long			
Cable extension		—————		Extension up to total 100 m 328.084 ft is possible with 0.3 mm ² , or more, cable. (however, supply voltage 12 V DC 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.

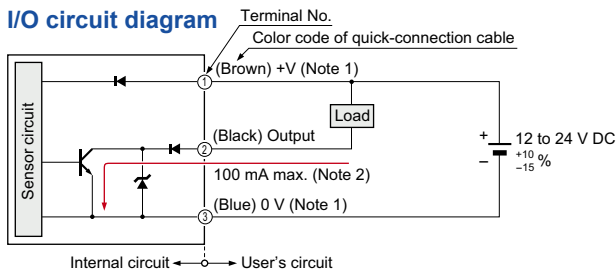
• Number of sensor heads mountable closely (Unit: set)

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

I/O CIRCUIT AND WIRING DIAGRAMS

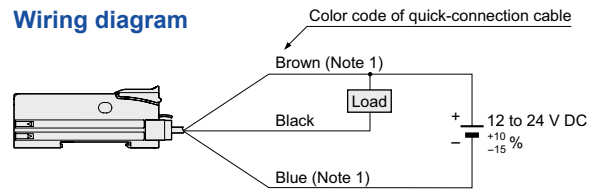
FX-501

NPN output type



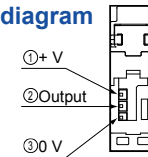
Notes: 1) The quick-connection sub cable does not have +V (brown) and 0 V (blue). The power is supplied from the connector of the main cable.
2) 50 mA max., if five amplifiers or more, are connected together.

Wiring diagram



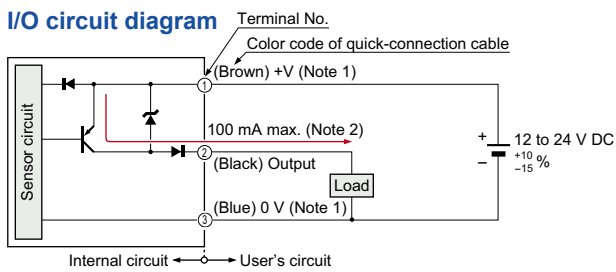
Note: The quick-connection sub cable does not have a brown and a blue lead wire.

Terminal arrangement diagram



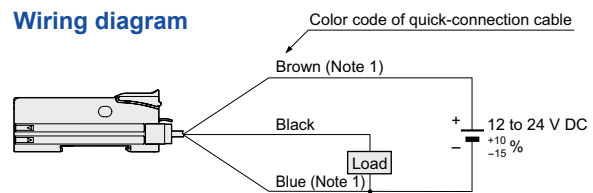
FX-501P

PNP output type



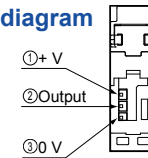
Notes: 1) The quick-connection sub cable does not have +V (brown) and 0 V (blue). The power is supplied from the connector of the main cable.
2) 50 mA max., if five amplifiers or more, are connected together.

Wiring diagram



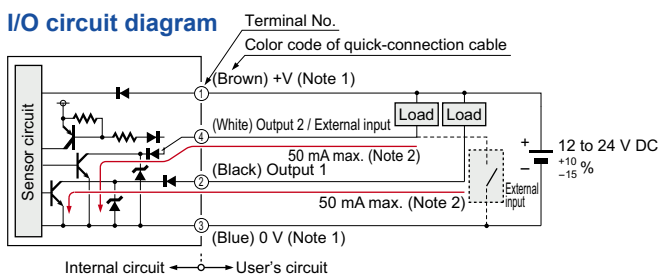
Note: The quick-connection sub cable does not have a brown and a blue lead wire.

Terminal arrangement diagram



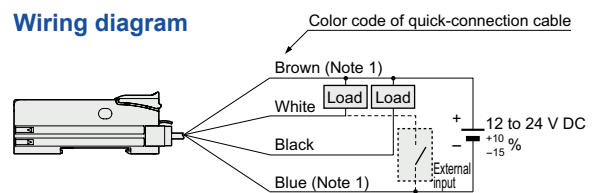
FX-502

NPN output type



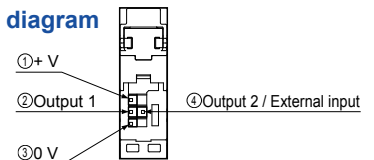
Notes: 1) The quick-connection sub cable does not have +V (brown) and 0 V (blue). The power is supplied from the connector of the main cable.
2) 25 mA max., if five amplifiers or more, are connected together.

Wiring diagram



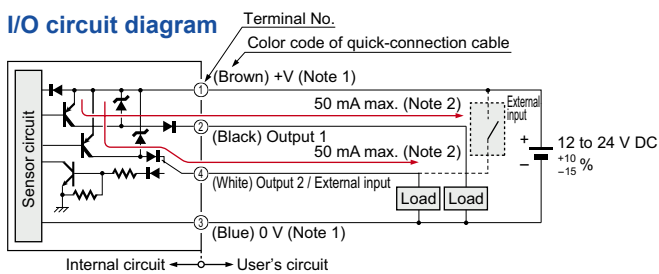
Note: The quick-connection sub cable does not have a brown and a blue lead wire.

Terminal arrangement diagram



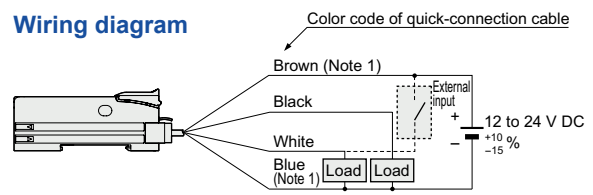
FX-502P

PNP output type



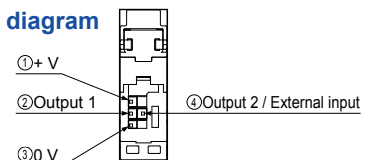
Notes: 1) The quick-connection sub cable does not have +V (brown) and 0 V (blue). The power is supplied from the connector of the main cable.
2) 25 mA max., if five amplifiers or more, are connected together.

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

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MICRO PHOTO-ELECTRIC SENSORS

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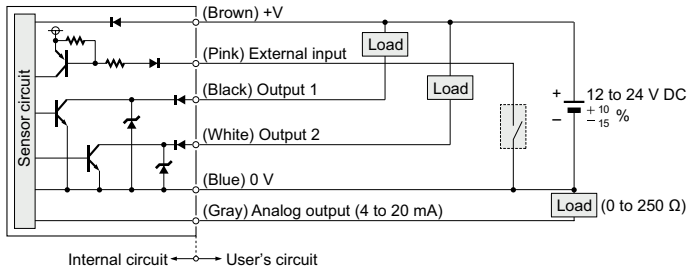
FX-100

FX-410

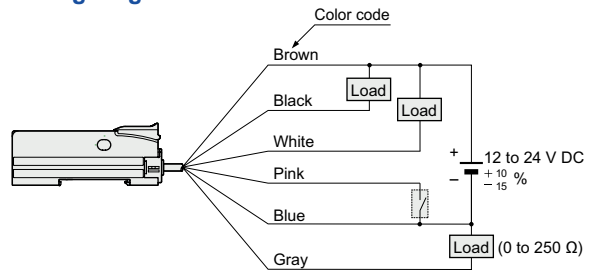
FX-505-C2

NPN output type

I/O circuit diagram



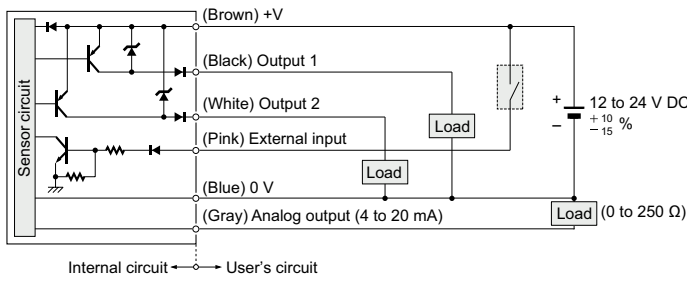
Wiring diagram



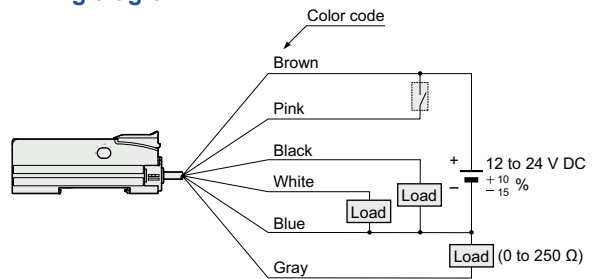
FX-505P-C2

PNP output type

I/O circuit diagram



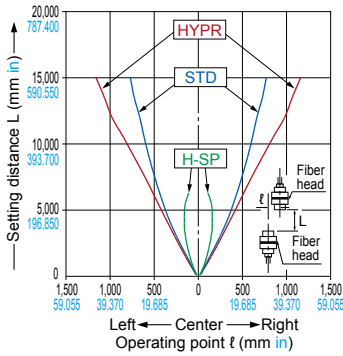
Wiring diagram



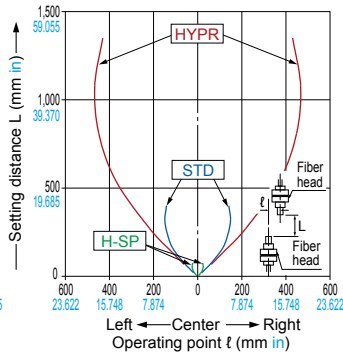
SENSING CHARACTERISTICS (TYPICAL)

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

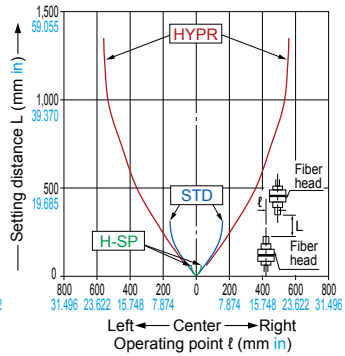
FT-140 Thru-beam type



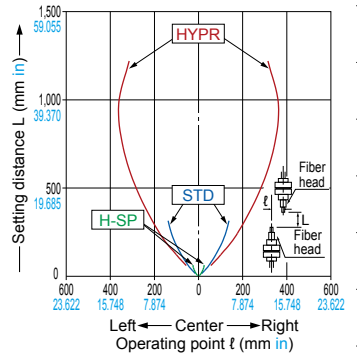
FT-30 Thru-beam type



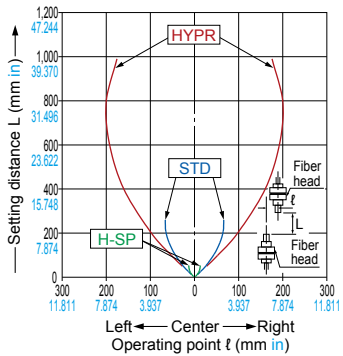
FT-31 Thru-beam type



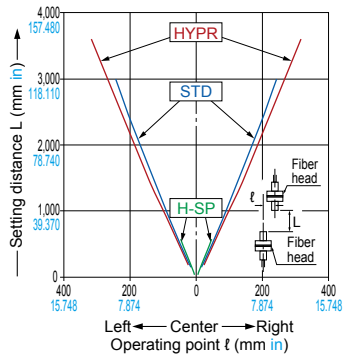
FT-31S Thru-beam type



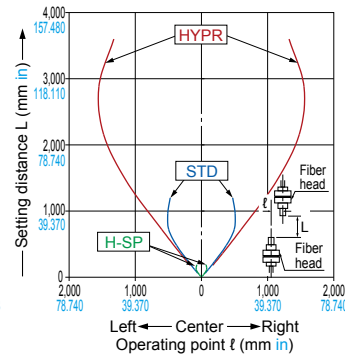
FT-31W Thru-beam type



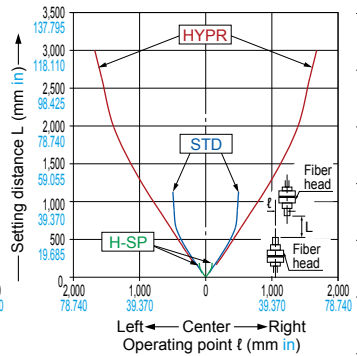
FT-32 Thru-beam type



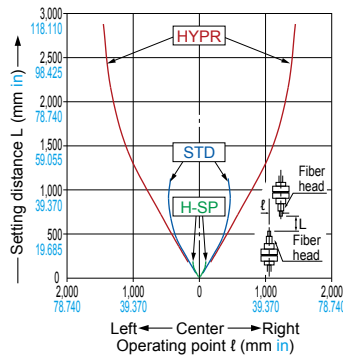
FT-40 Thru-beam type



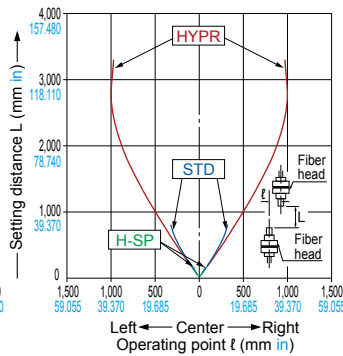
FT-42 Thru-beam type



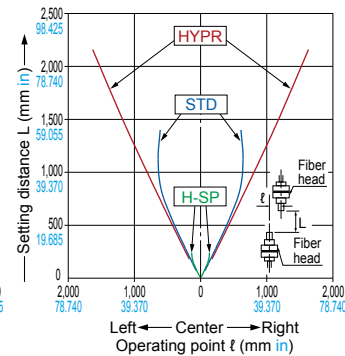
FT-42S Thru-beam type



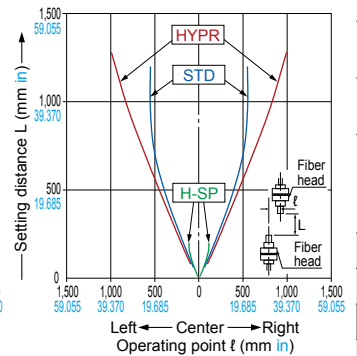
FT-42W Thru-beam type



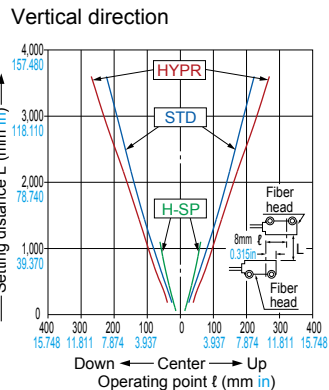
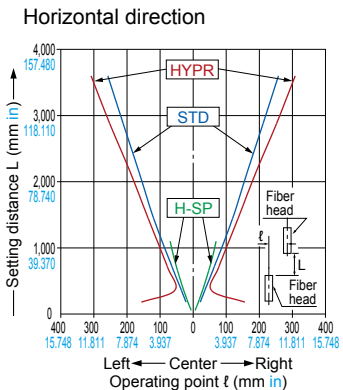
FT-43 Thru-beam type



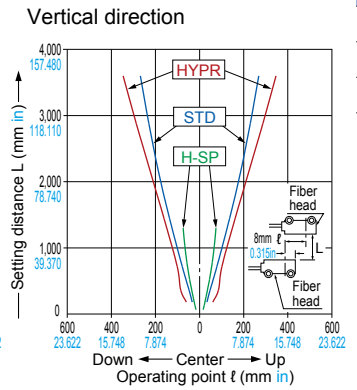
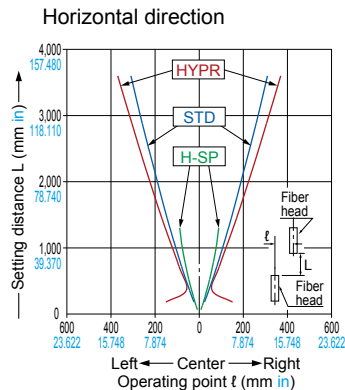
FT-45X Thru-beam type



FT-A11 Thru-beam type



FT-A11W Thru-beam type



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SENSING CHARACTERISTICS (TYPICAL)

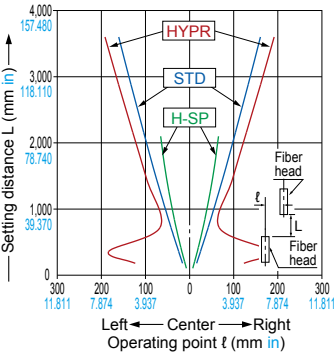
Thru-beam type Parallel deviation Sensing characteristics are listed in the alphabetic order of Model No. (Models with same sensing characteristics are grouped together.)

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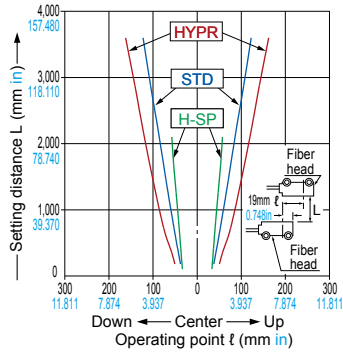
FT-A32

Thru-beam type

Horizontal direction



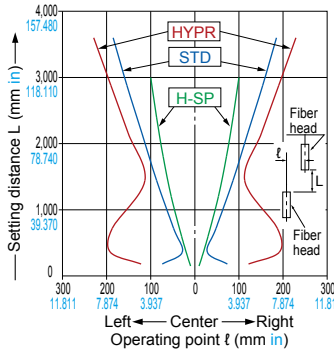
Vertical direction



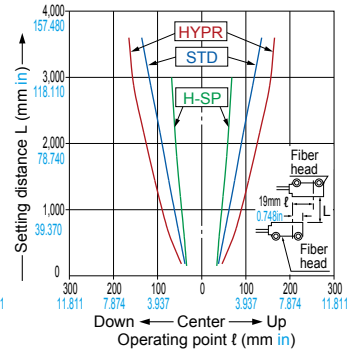
FT-A32W

Thru-beam type

Horizontal direction



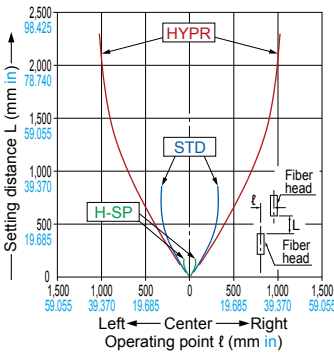
Vertical direction



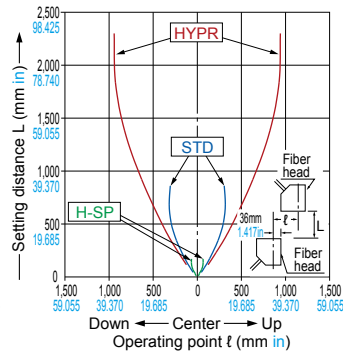
FT-AL05

Thru-beam type

Horizontal direction

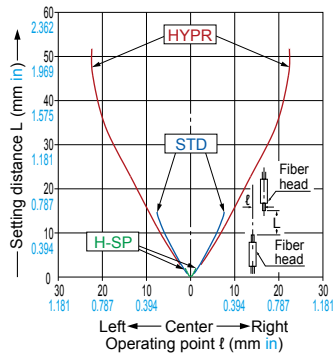


Vertical direction



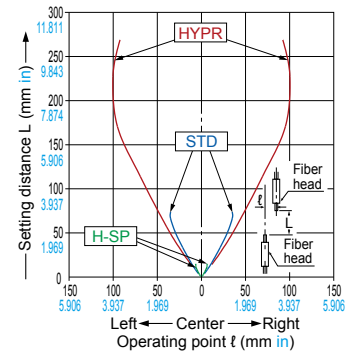
FT-E13

Thru-beam type

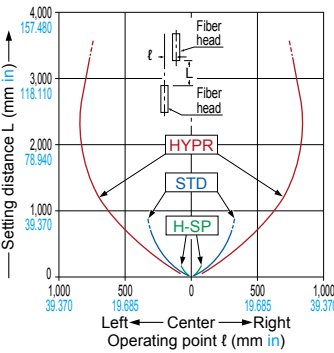


FT-E23

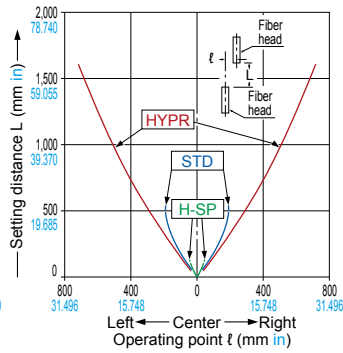
Thru-beam type



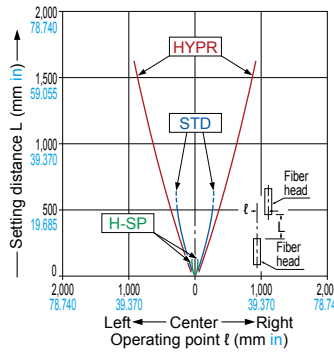
FT-H13-FM2 Thru-beam type



FT-H20-J20-S FT-H20-J30-S FT-H20-J50-S Thru-beam type



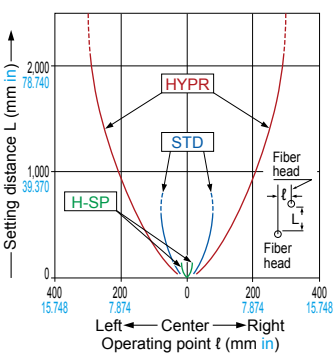
FT-H20-M1 Thru-beam type



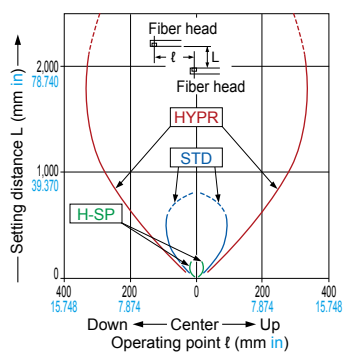
- FX-500**
- FX-550**
- FX-100**
- FX-410**

FT-H20-VJ50-S FT-H20-VJ80-S Thru-beam type

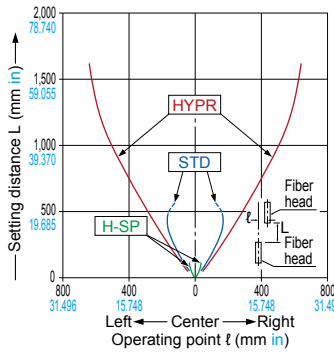
Horizontal direction



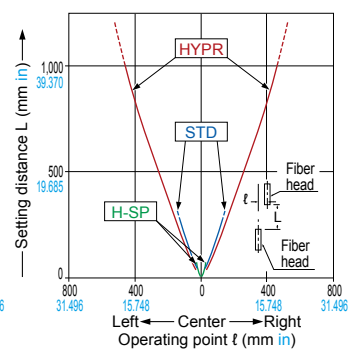
Vertical direction



FT-H20W-M1 Thru-beam type



FT-H30-M1V-S Thru-beam type

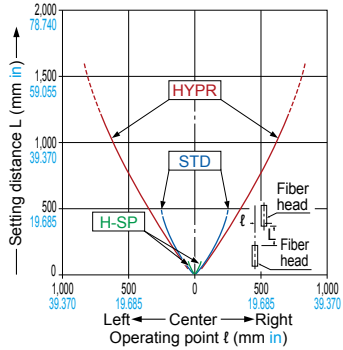


SENSING CHARACTERISTICS (TYPICAL)

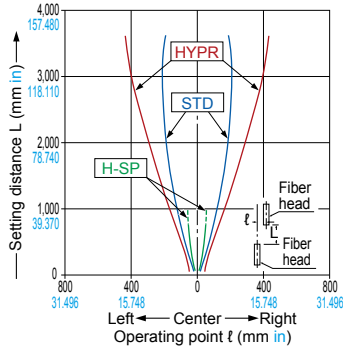
Thru-beam type Parallel deviation

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

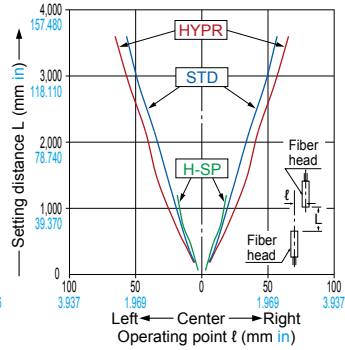
FT-H35-M2 Thru-beam type
FT-H35-M2S6



FT-HL80Y Thru-beam type

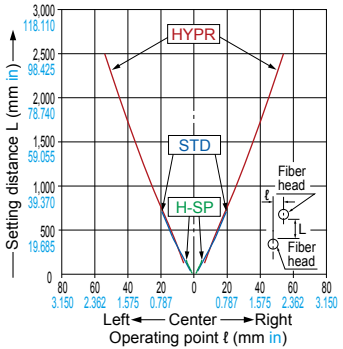


FT-KS40 Thru-beam type

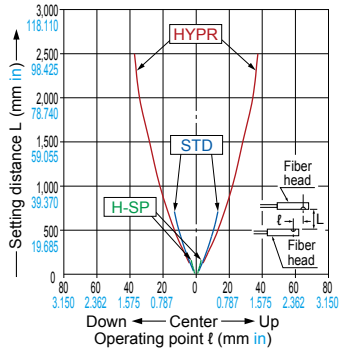


FT-KV26 Thru-beam type

Horizontal direction

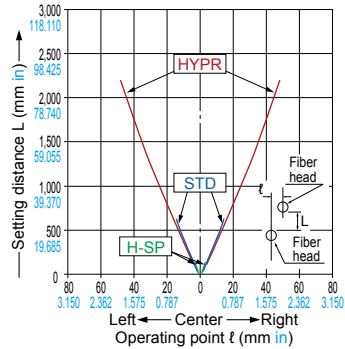


Vertical direction

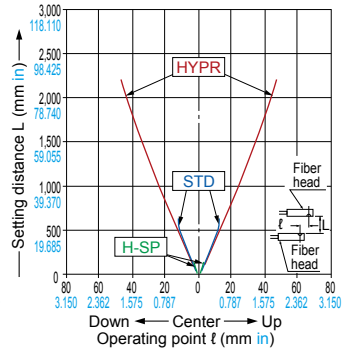


FT-KV26H1 Thru-beam type

Horizontal direction

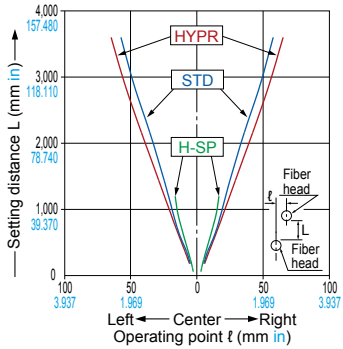


Vertical direction

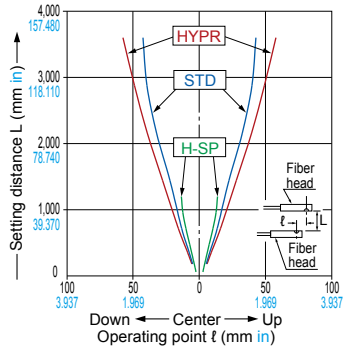


FT-KV40 Thru-beam type

Horizontal direction

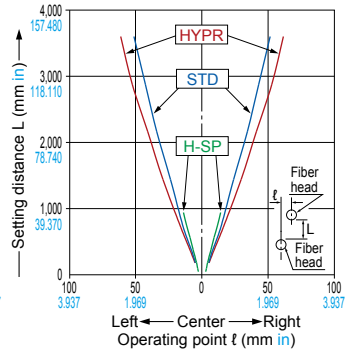


Vertical direction

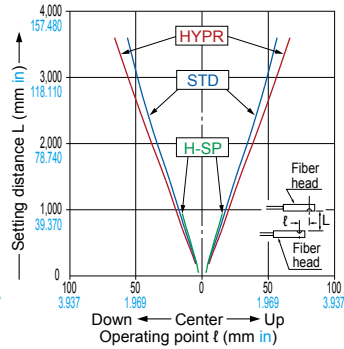


FT-KV40W Thru-beam type

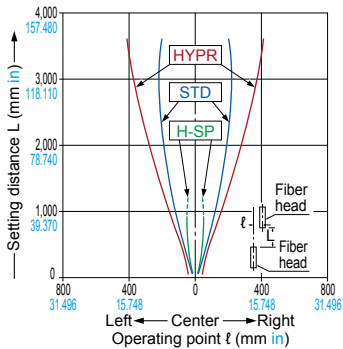
Horizontal direction



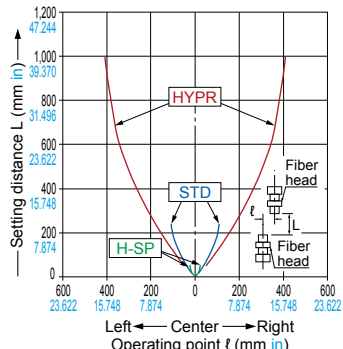
Vertical direction



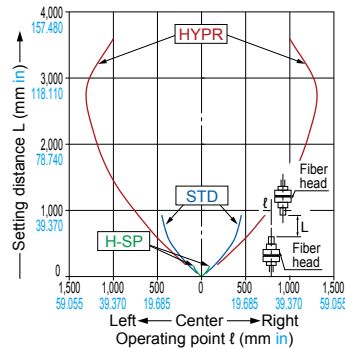
FT-L80Y Thru-beam type



FT-R31 Thru-beam type



FT-R40 Thru-beam type



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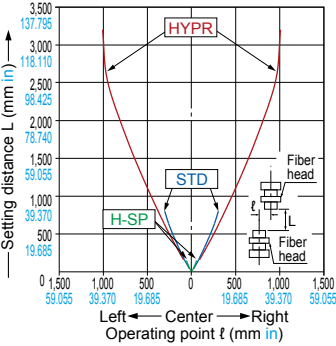
SENSING CHARACTERISTICS (TYPICAL)

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

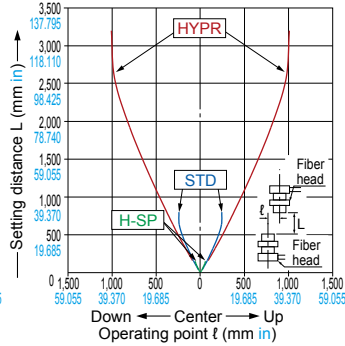
FT-R41W

Thru-beam type

Horizontal direction



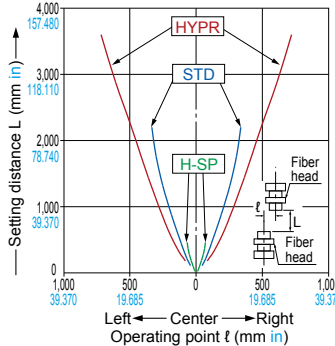
Vertical direction



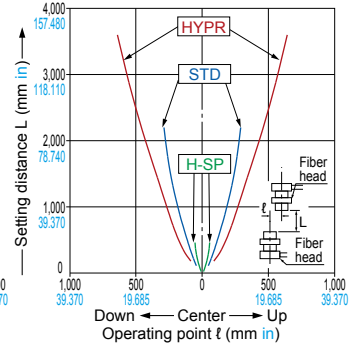
FT-R42W

Thru-beam type

Horizontal direction

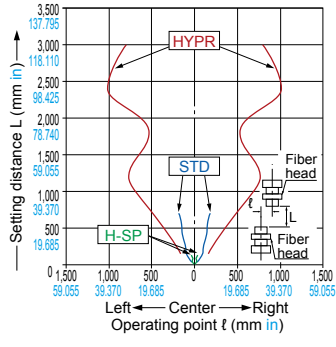


Vertical direction



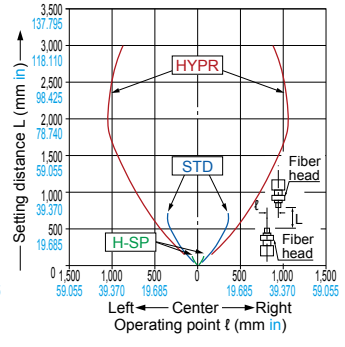
FT-R43

Thru-beam type



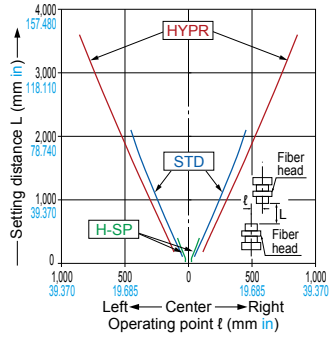
FT-R44Y

Thru-beam type



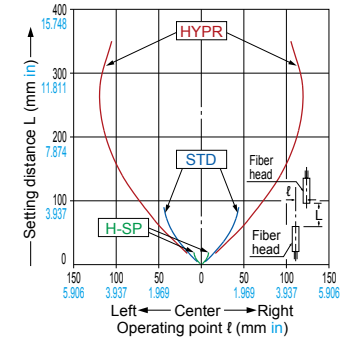
FT-R60Y

Thru-beam type



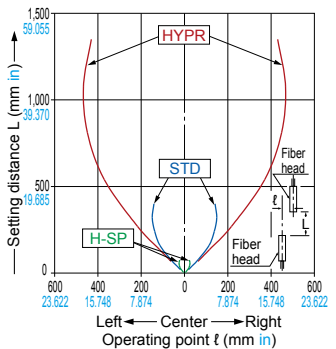
FT-S11

Thru-beam type



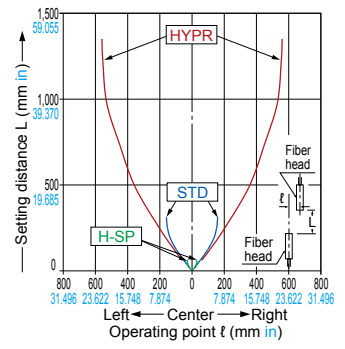
FT-S20

Thru-beam type



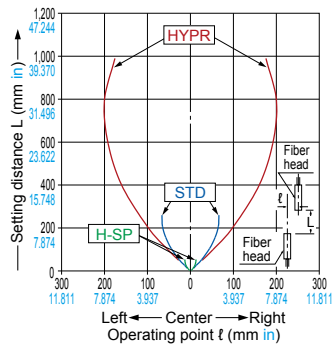
FT-S21

Thru-beam type



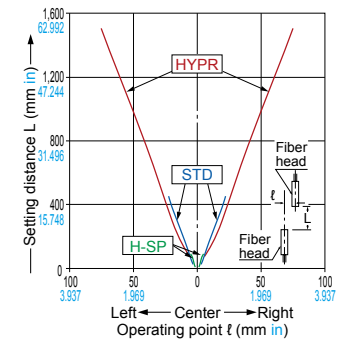
FT-S21W

Thru-beam type



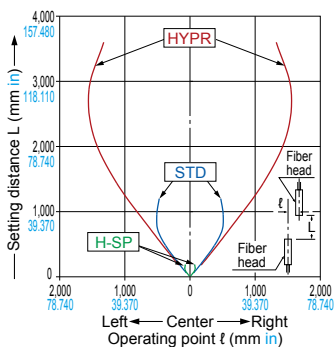
FT-S22

Thru-beam type



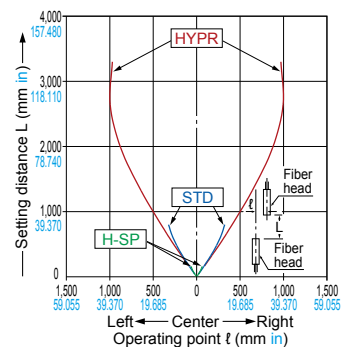
FT-S30

Thru-beam type



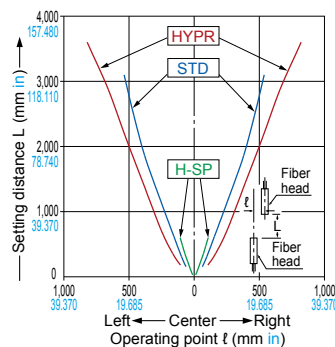
FT-S31W

Thru-beam type



FT-S32

Thru-beam type

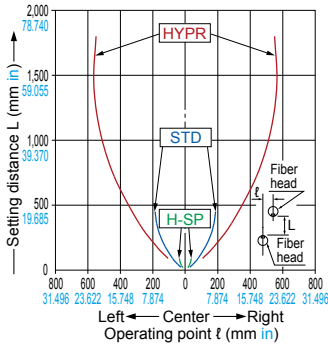


SENSING CHARACTERISTICS (TYPICAL)

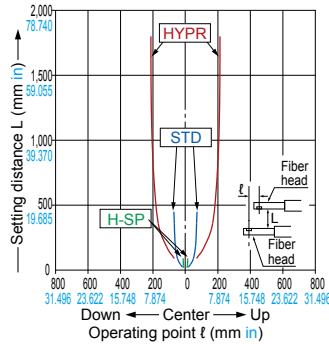
Thru-beam type Parallel deviation Sensing characteristics are listed in the alphabetic order of Model No.

FT-V23 Thru-beam type

Horizontal direction

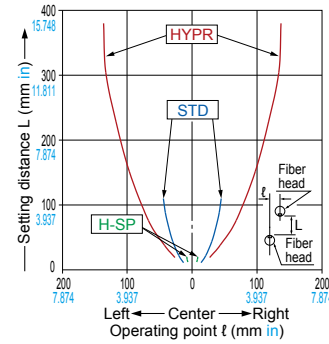


Vertical direction

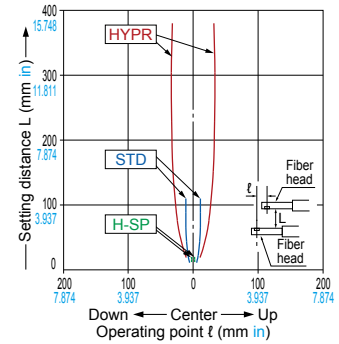


FT-V24W Thru-beam type

Horizontal direction

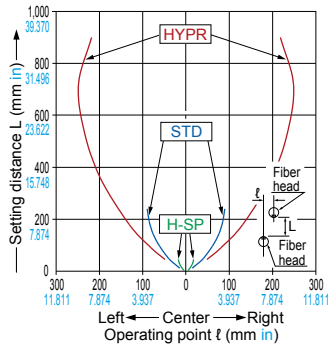


Vertical direction

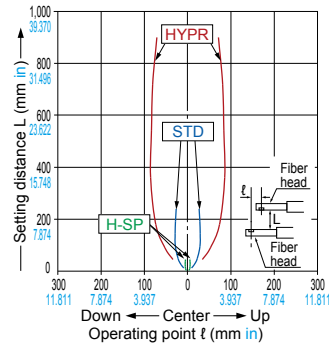


FT-V25 Thru-beam type

Horizontal direction

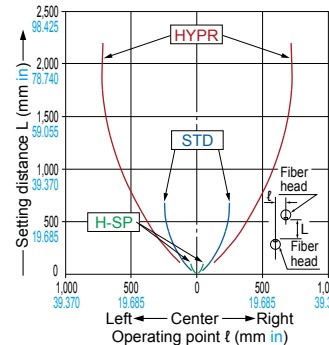


Vertical direction

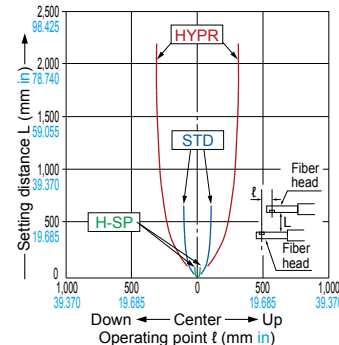


FT-V30 Thru-beam type

Horizontal direction

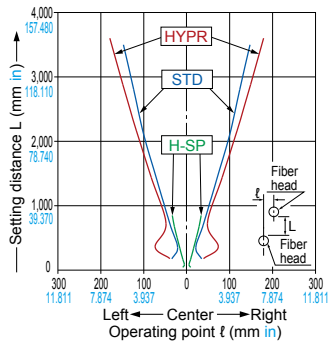


Vertical direction

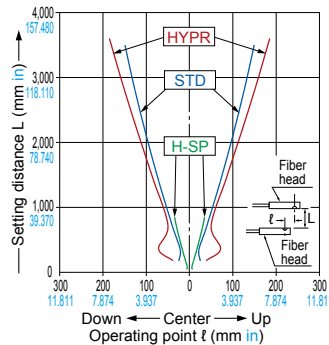


FT-V40 Thru-beam type

Horizontal direction

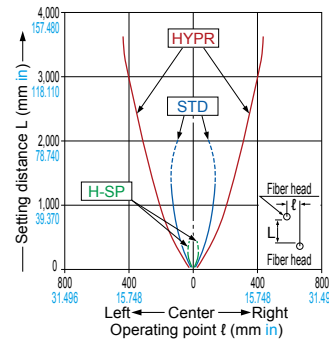


Vertical direction

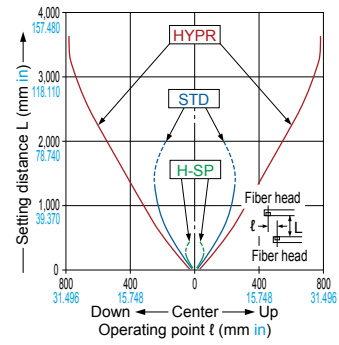


FT-V80Y Thru-beam type

Horizontal direction

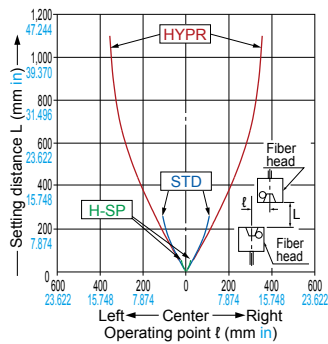


Vertical direction



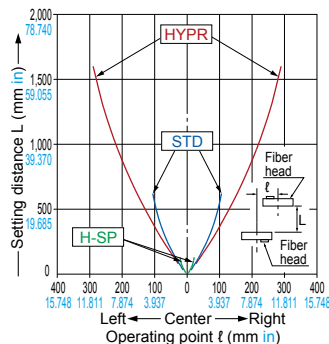
FT-Z20HBW Thru-beam type

Horizontal direction

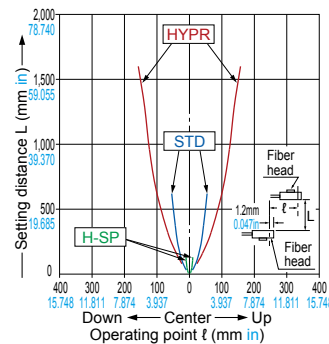


FT-Z20W Thru-beam type

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

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

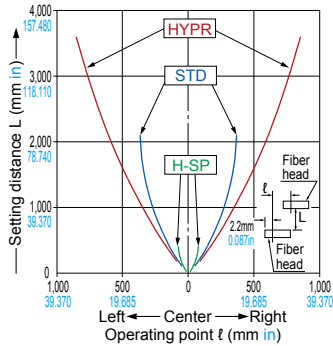
SENSING CHARACTERISTICS (TYPICAL)

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

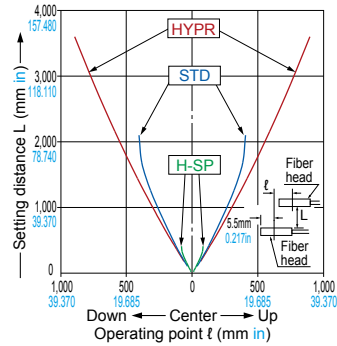
FT-Z30

Thru-beam type

Horizontal direction



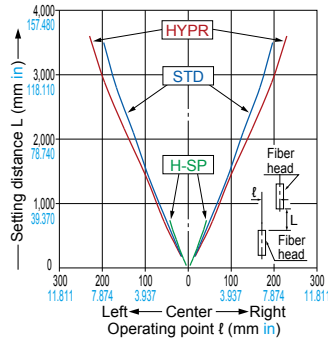
Vertical direction



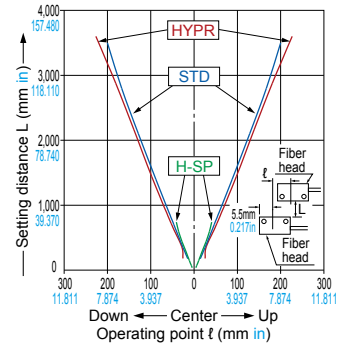
FT-Z30E

Thru-beam type

Horizontal direction



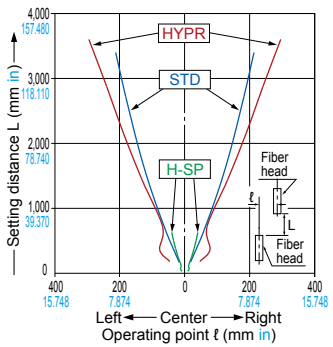
Vertical direction



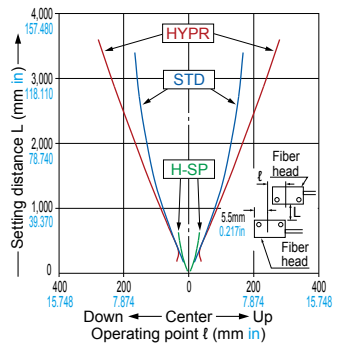
FT-Z30EW

Thru-beam type

Horizontal direction



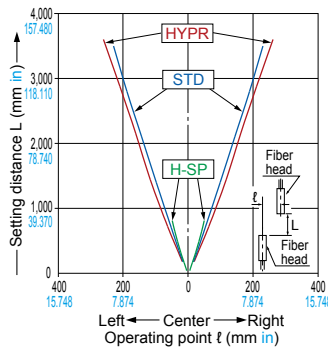
Vertical direction



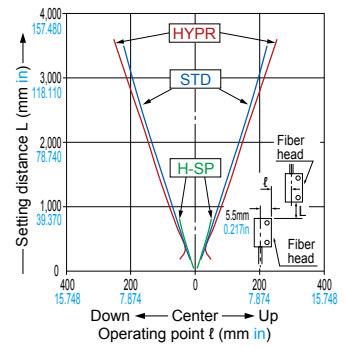
FT-Z30H

Thru-beam type

Horizontal direction



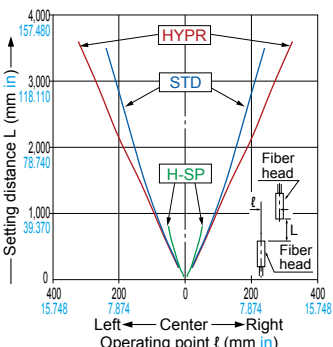
Vertical direction



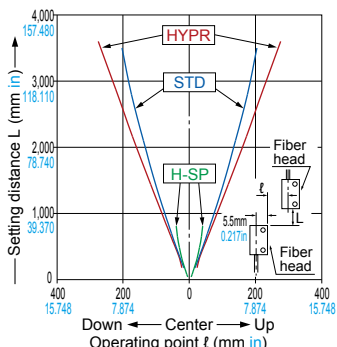
FT-Z30HW

Thru-beam type

Horizontal direction



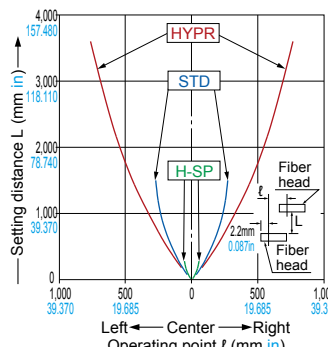
Vertical direction



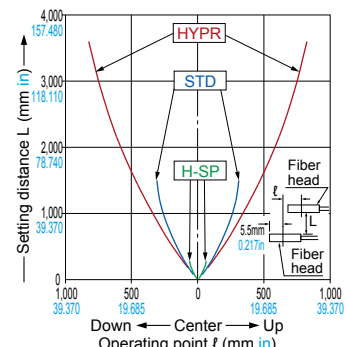
FT-Z30W

Thru-beam type

Horizontal direction



Vertical direction

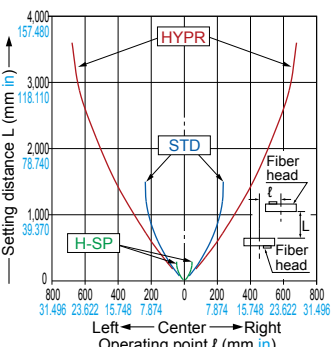


FX-500

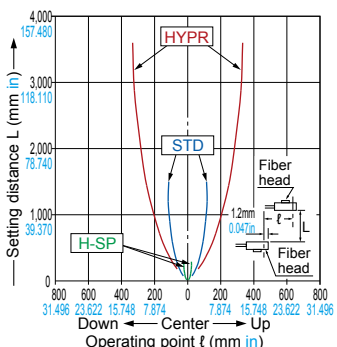
FT-Z40W

Thru-beam type

Horizontal direction



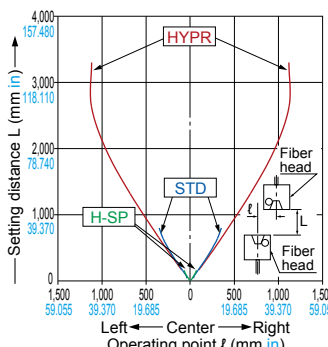
Vertical direction



FT-Z40HBW

Thru-beam type

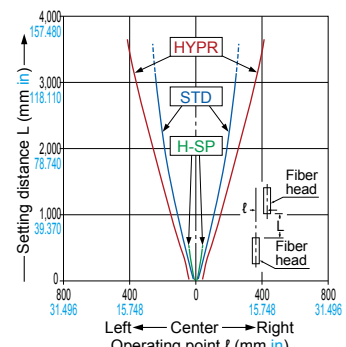
Horizontal direction



FT-Z802Y

Thru-beam type

Horizontal direction



FX-550

FX-100

FX-410

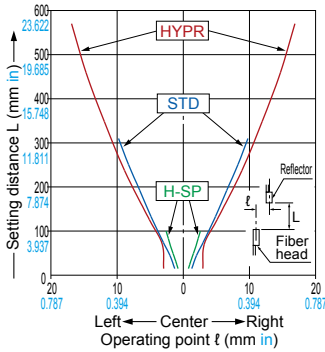
SENSING CHARACTERISTICS (TYPICAL)

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

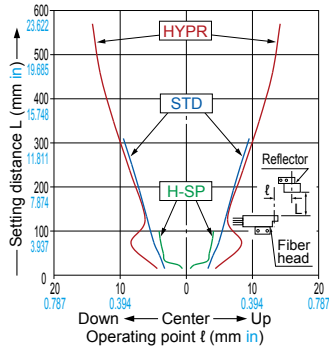
FR-KZ22E

Retroreflective type

Horizontal direction



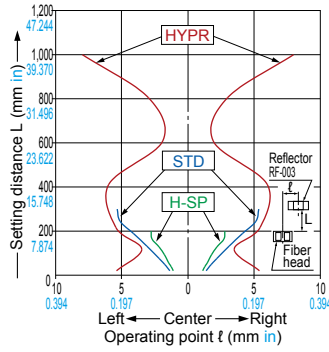
Vertical direction



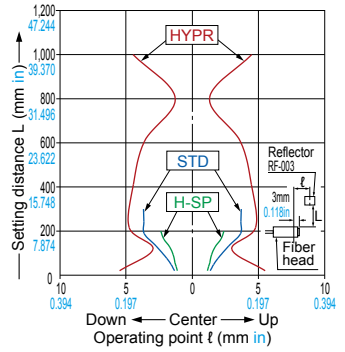
FR-KZ50E

Retroreflective type

Horizontal direction



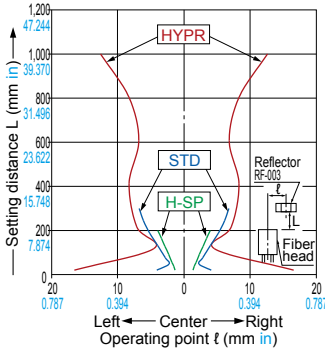
Vertical direction



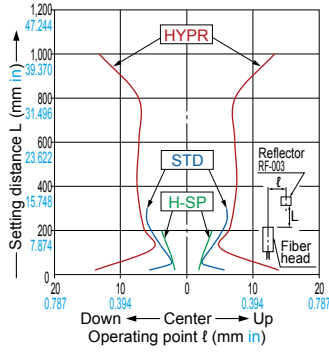
FR-KZ50H

Retroreflective type

Horizontal direction



Vertical direction

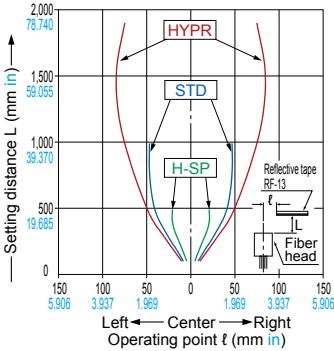


FR-Z50HW

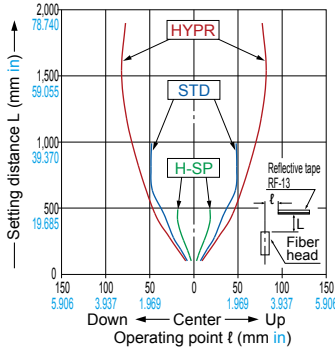
Retroreflective type

With reflective tape RF-13 (attached)

Horizontal direction

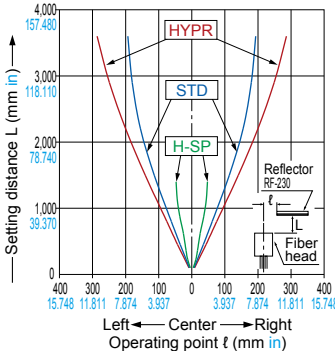


Vertical direction

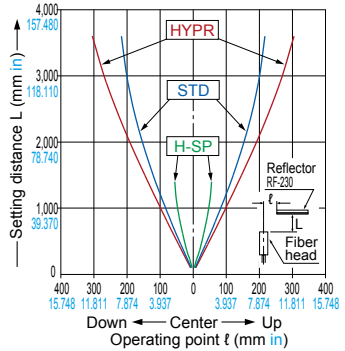


With reflector RF-230 (optional)

Horizontal direction



Vertical direction

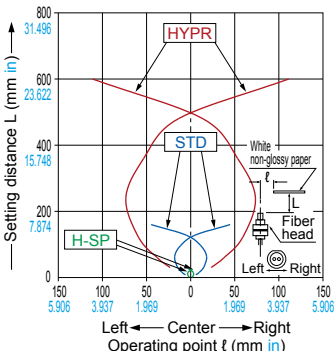


Reflective type Sensing field Sensing characteristics are listed in the alphabetic order of the Model No.

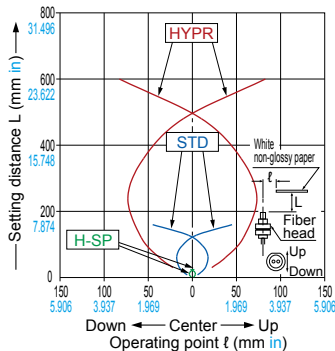
FD-30

Reflective type

Horizontal direction



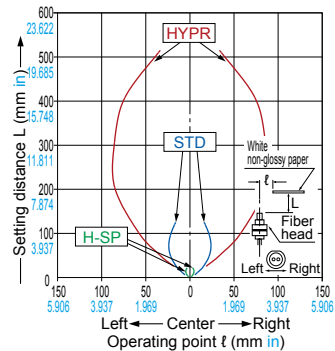
Vertical direction



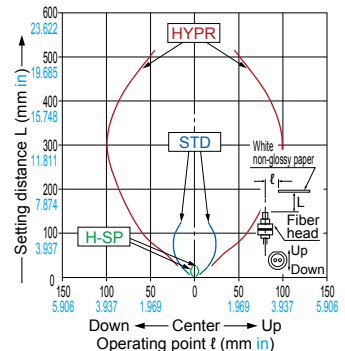
FD-31

Reflective type

Horizontal direction



Vertical direction



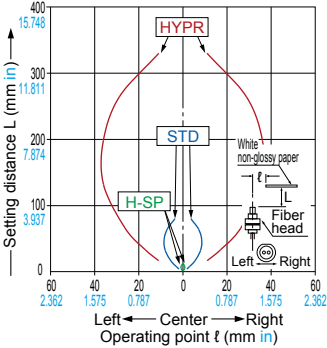
SENSING CHARACTERISTICS (TYPICAL)

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

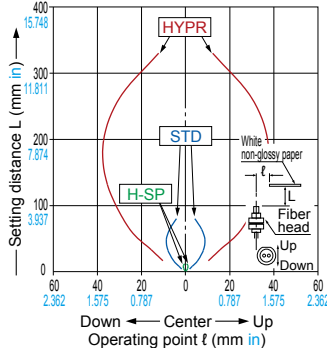
FD-31W

Reflective type

Horizontal direction

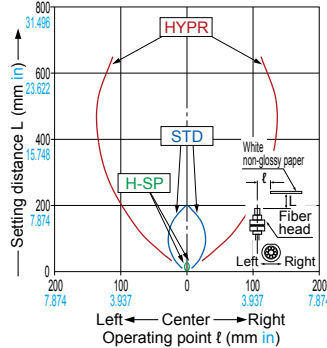


Vertical direction



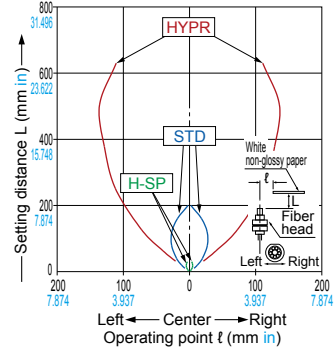
FD-32G

Reflective type



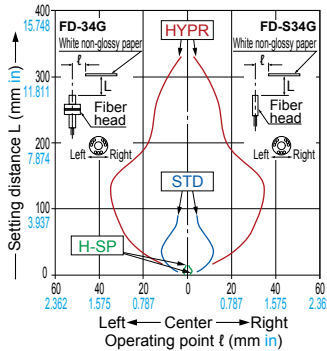
FD-32GX

Reflective type



FD-34G FD-S34G

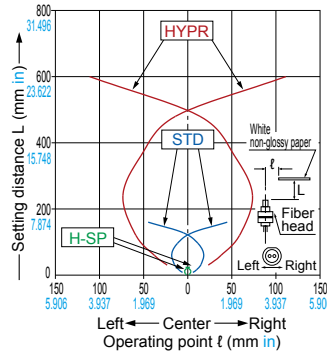
Reflective type



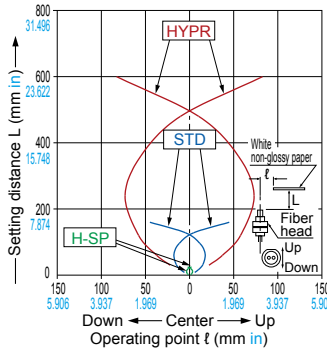
FD-40

Reflective type

Horizontal direction



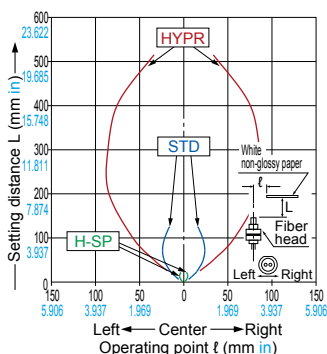
Vertical direction



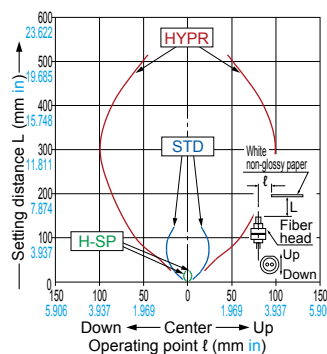
FD-41

Reflective type

Horizontal direction



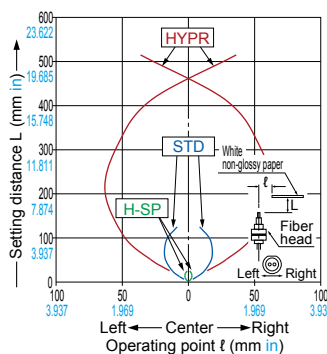
Vertical direction



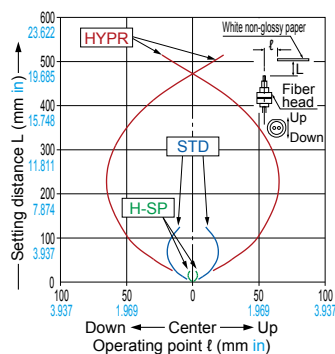
FD-41S

Reflective type

Horizontal direction



Vertical direction

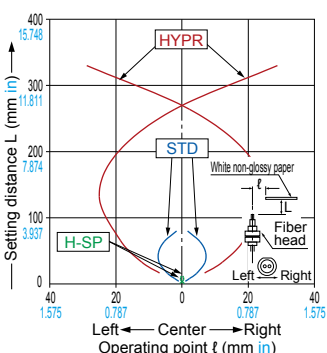


FX-500

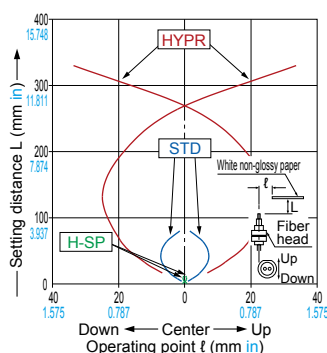
FD-41SW

Reflective type

Horizontal direction



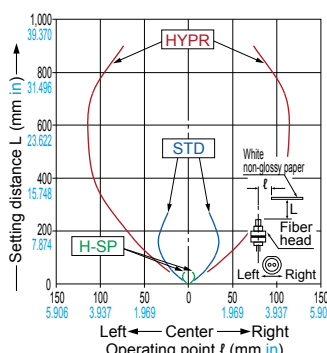
Vertical direction



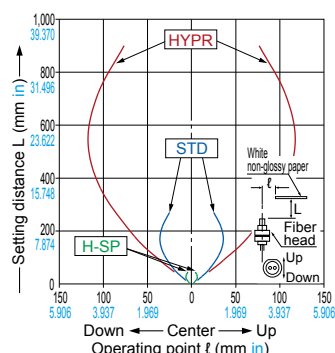
FD-41W

Reflective type

Horizontal direction



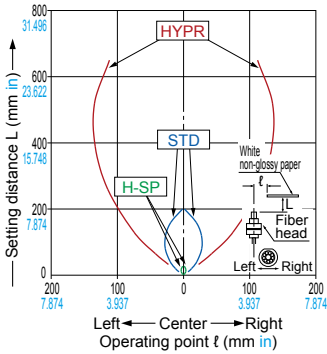
Vertical direction



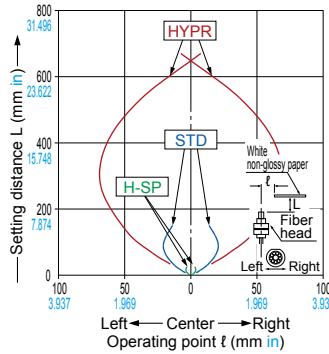
SENSING CHARACTERISTICS (TYPICAL)

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

FD-42G Reflective type

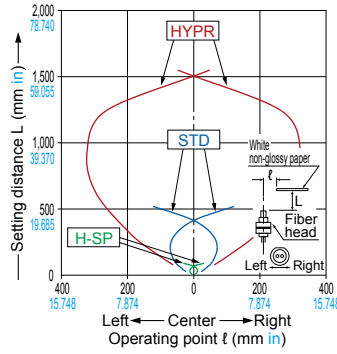


FD-42GW Reflective type

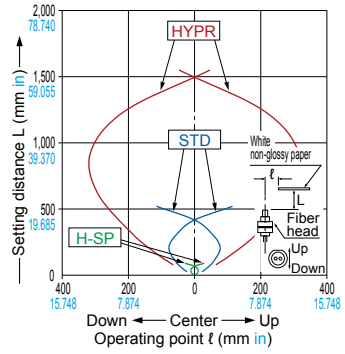


FD-60

Horizontal direction

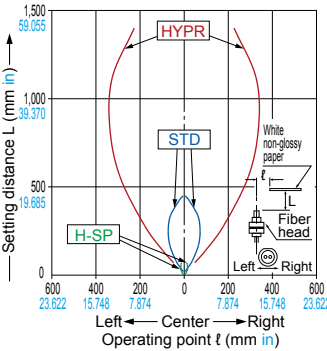


Vertical direction

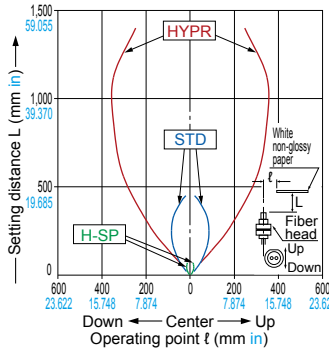


FD-61 Reflective type

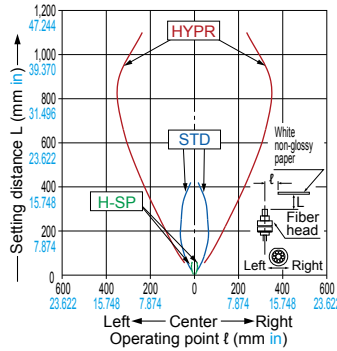
Horizontal direction



Vertical direction

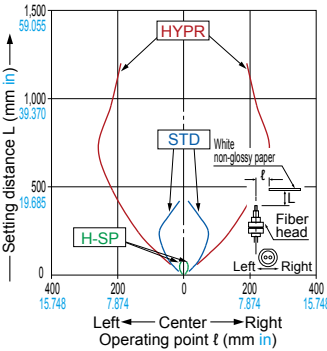


FD-61G Reflective type

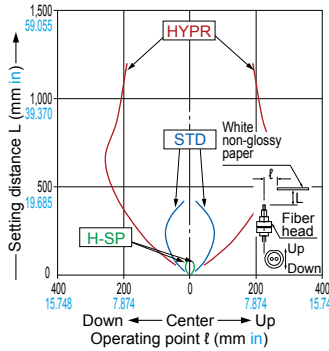


FD-61S Reflective type

Horizontal direction

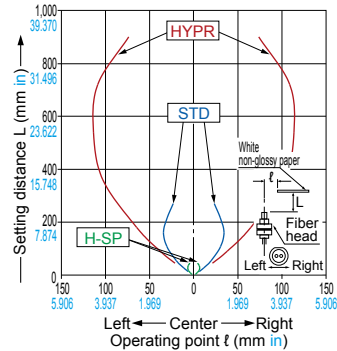


Vertical direction

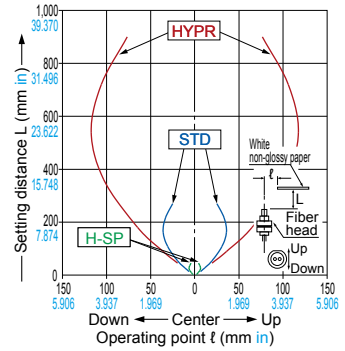


FD-61W Reflective type

Horizontal direction

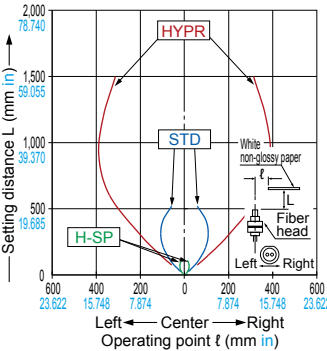


Vertical direction

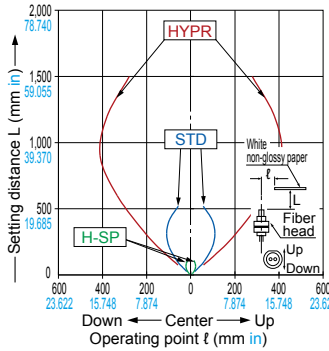


FD-62 Reflective type

Horizontal direction

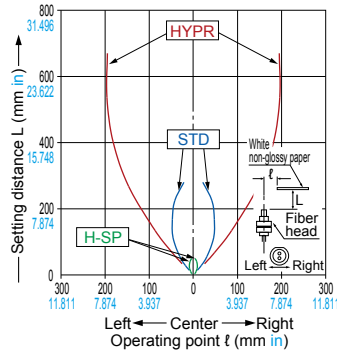


Vertical direction

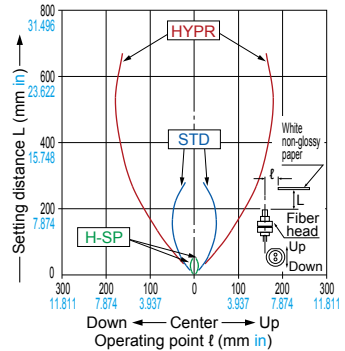


FD-64X Reflective type

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

SMALL 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

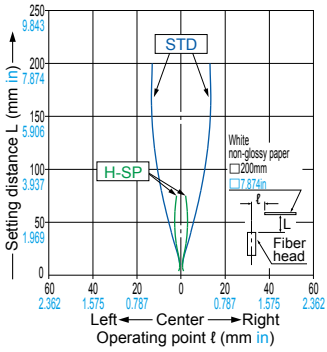
SENSING CHARACTERISTICS (TYPICAL)

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

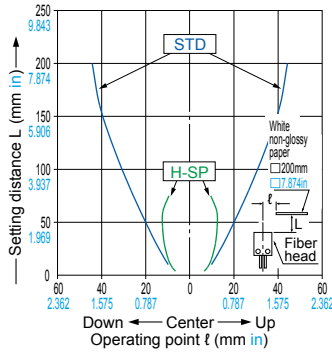
FD-A16

Reflective type

Horizontal direction



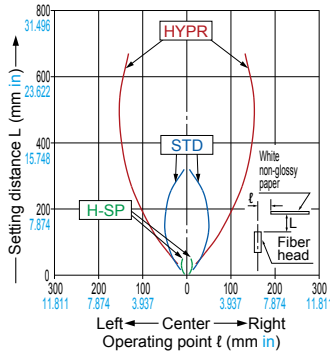
Vertical direction



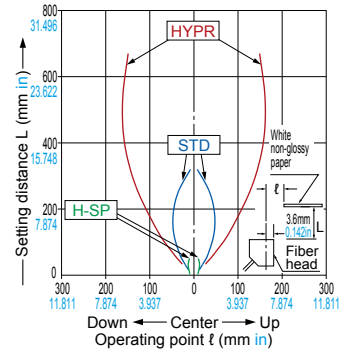
FD-AL11

Reflective type

Horizontal direction



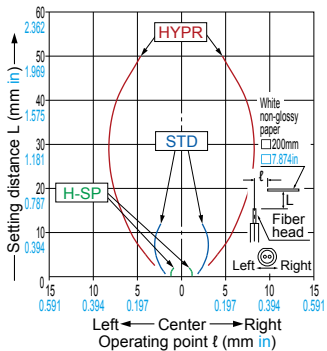
Vertical direction



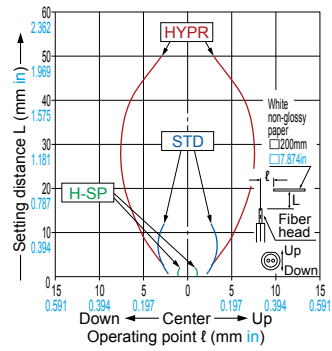
FD-E13

Reflective type

Horizontal direction

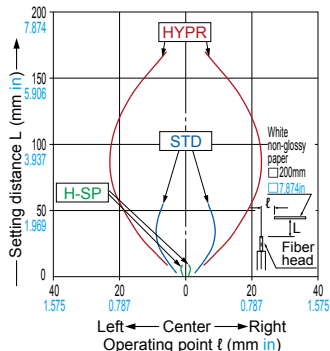


Vertical direction



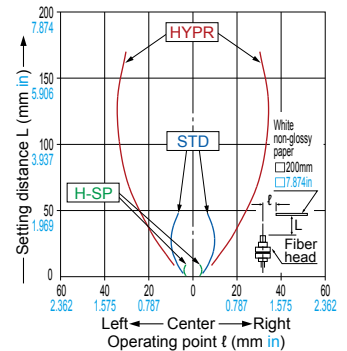
FD-E23

Reflective type



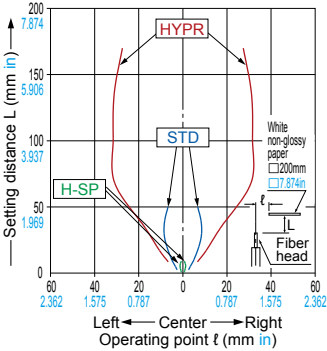
FD-EG30

Reflective type



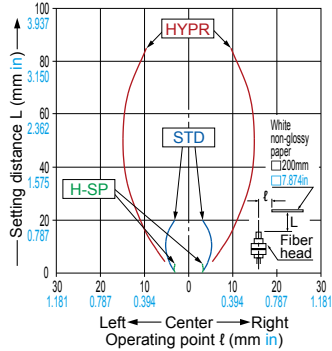
FD-EG30S

Reflective type



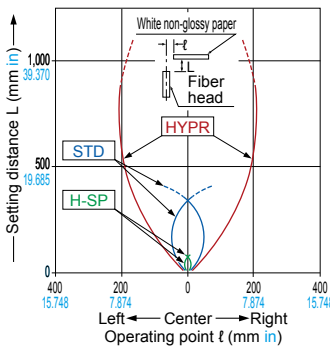
FD-EG31

Reflective type



FD-H13-FM2

Reflective type

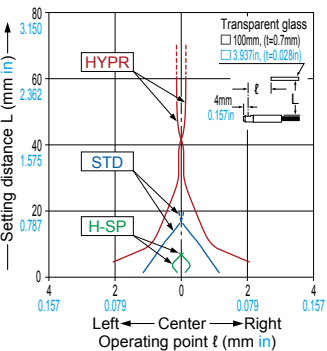


FX-500

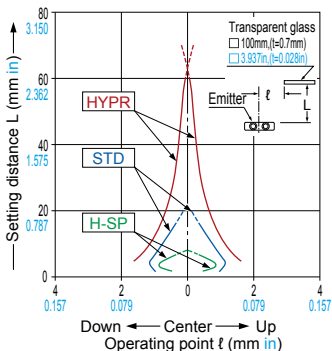
FD-H18-L31

Reflective type

Horizontal direction

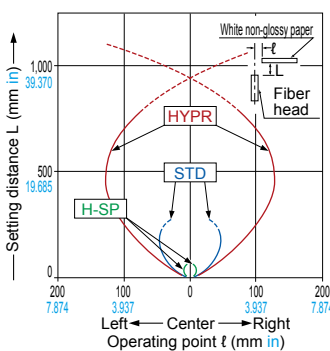


Vertical direction



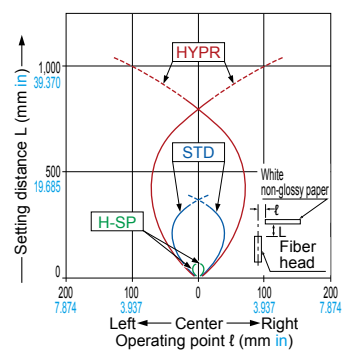
FD-H20-21

Reflective type



FD-H20-M1

Reflective type



FX-550

FX-100

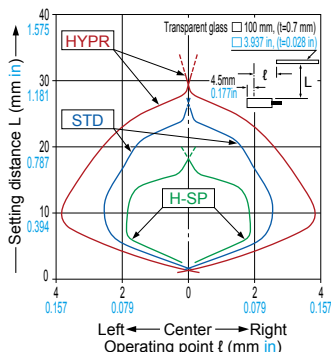
FX-410

SENSING CHARACTERISTICS (TYPICAL)

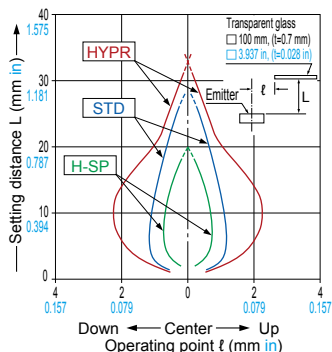
Reflective type Sensing field Sensing characteristics are listed in the alphabetic order of the Model No. (Models with same sensing characteristics are grouped together.)

FD-H25-L43 Reflective type

Horizontal direction

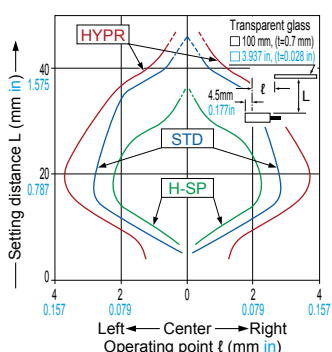


Vertical direction

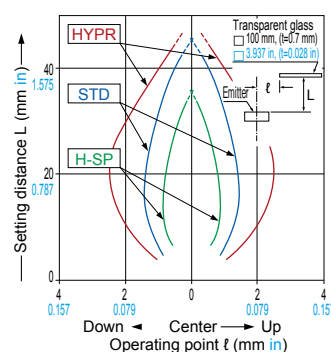


FD-H25-L45 Reflective type

Horizontal direction

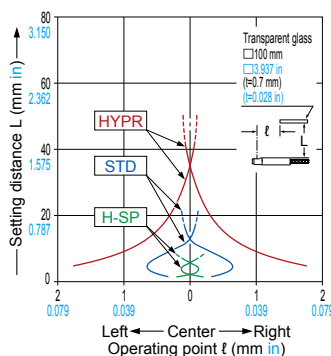


Vertical direction

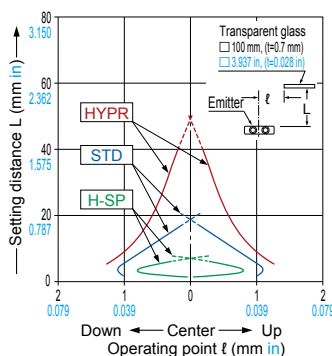


FD-H30-L32 Reflective type

Horizontal direction

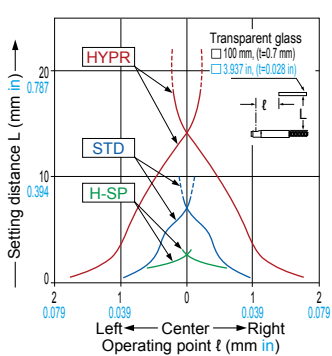


Vertical direction

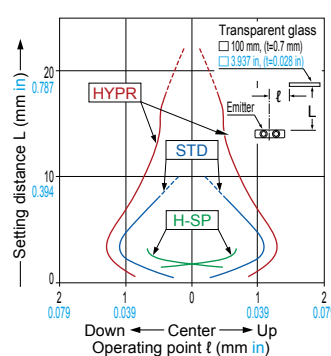


FD-H30-L32V-S Reflective type

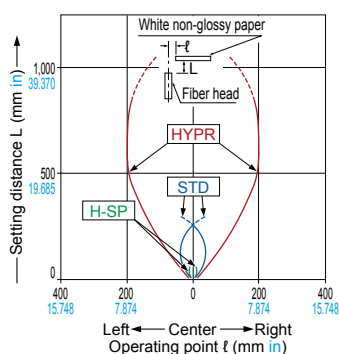
Horizontal direction



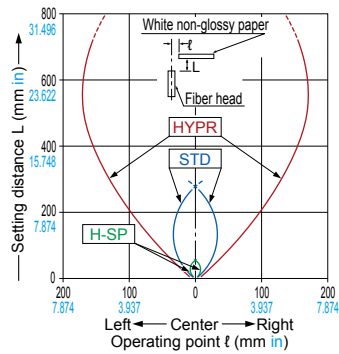
Vertical direction



FD-H35-20S Reflective type

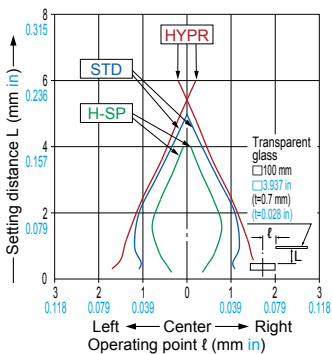


FD-H35-M2 Reflective type
FD-H35-M2S6

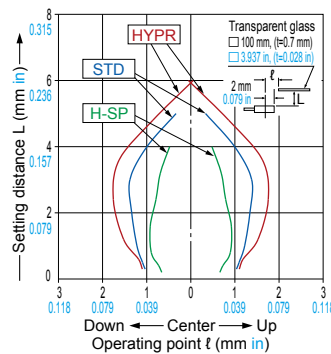


FD-L10 Reflective type

Horizontal direction

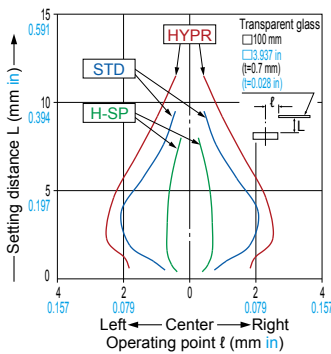


Vertical direction

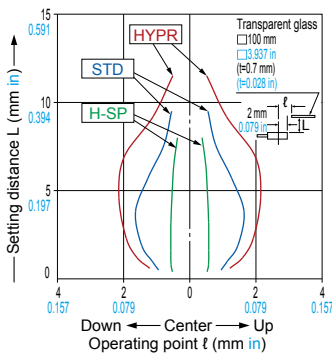


FD-L11 Reflective type

Horizontal direction

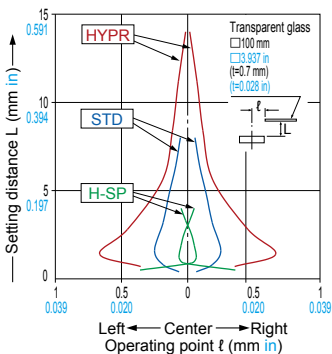


Vertical direction

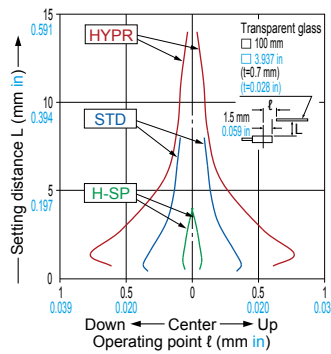


FD-L12W Reflective type

Horizontal direction



Vertical direction



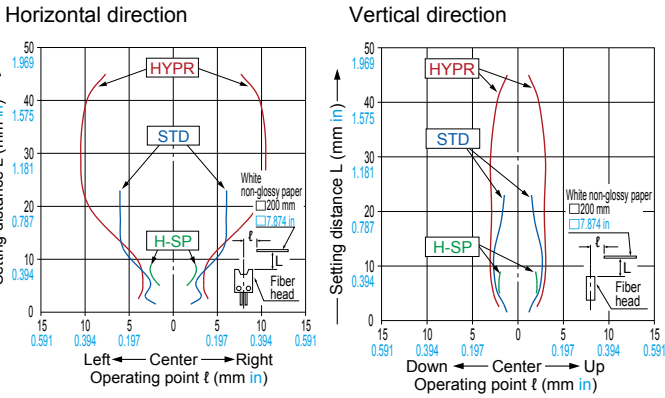
- FIBER SENSORS
- LASER SENSORS
- PHOTO-ELECTRIC SENSORS
- MICRO PHOTO-ELECTRIC SENSORS
- AREA SENSORS
- SAFETY LIGHT CURTAINS / SAFETY COMPONENTS
- PRESSURE / FLOW SENSORS
- INDUCTIVE PROXIMITY SENSORS
- PARTICULAR USE SENSORS
- SENSOR OPTIONS
- SIMPLE WIRE-SAVING UNITS
- WIRE-SAVING SYSTEMS
- MEASUREMENT 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**

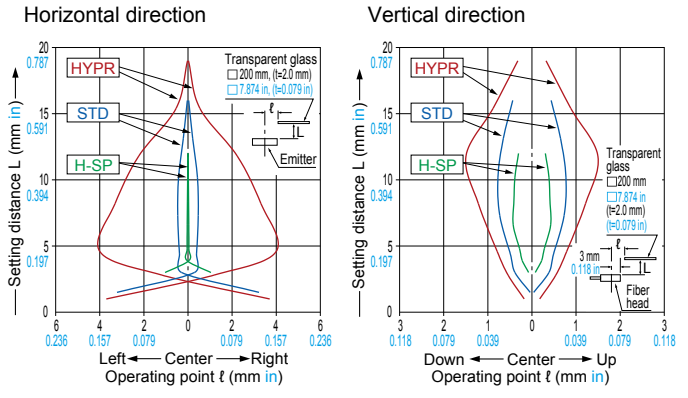
SENSING CHARACTERISTICS (TYPICAL)

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

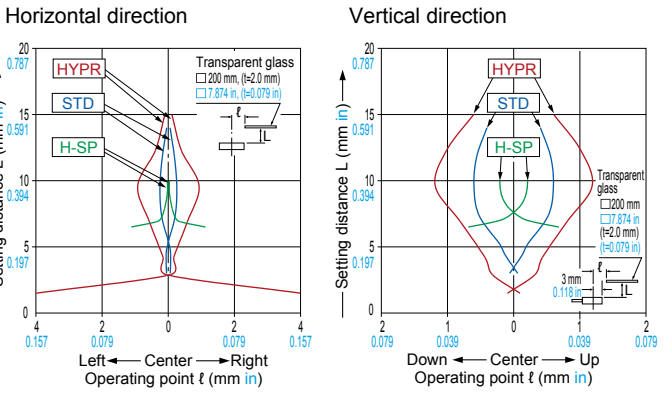
FD-L20H Reflective type



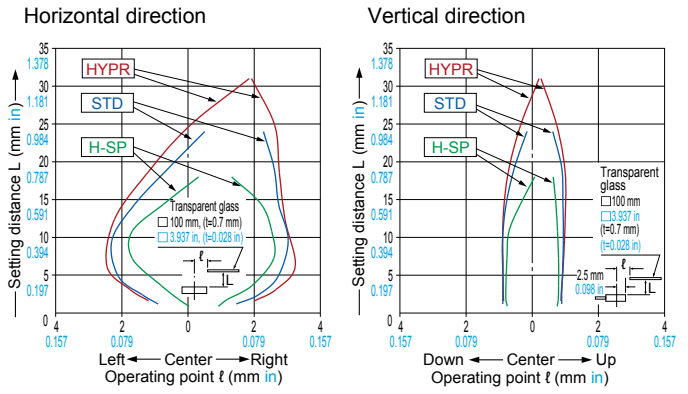
FD-L21 Reflective type



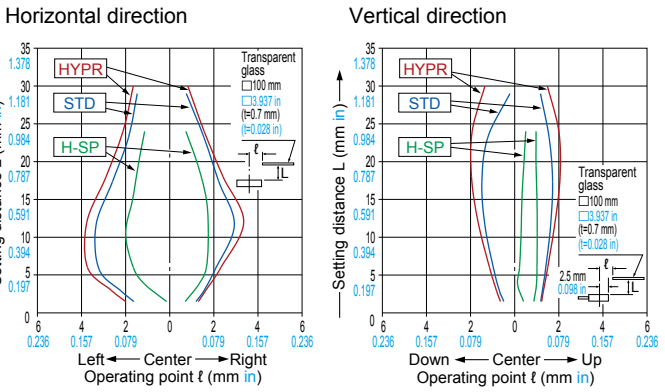
FD-L21W Reflective type



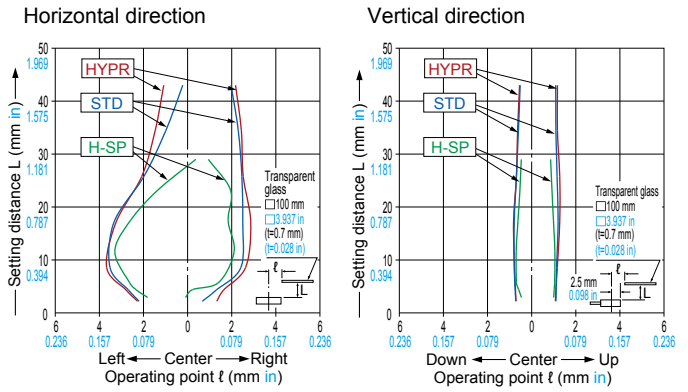
FD-L22A Reflective type



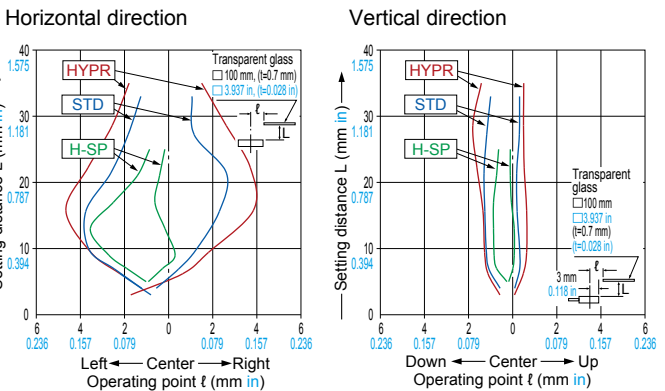
FD-L23 Reflective type



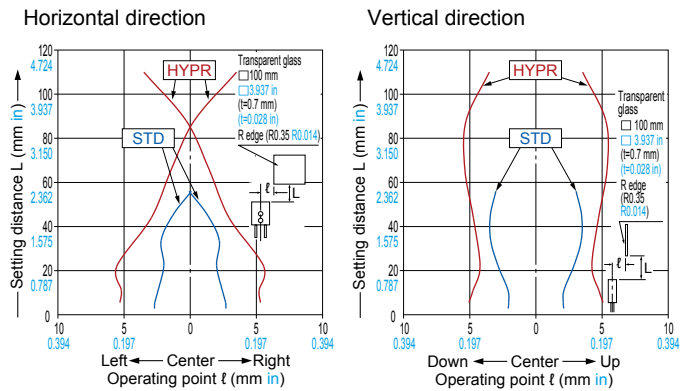
FD-L30A Reflective type



FD-L31A Reflective type



FD-L32H 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
- MEASURE-MENT SENSORS
- STATIC CONTROL DEVICES
- LASER MARKERS
- PLC
- HUMAN MACHINE INTERFACES
- ENERGY MANAGEMENT SOLUTIONS

- FA COMPONENTS
- MACHINE VISION SYSTEMS

- UV CURING SYSTEMS

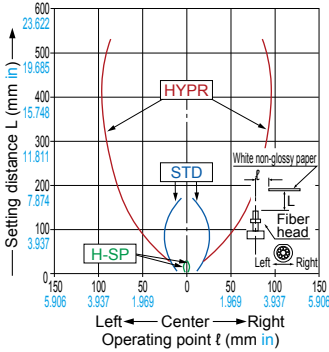
- Selection Guide
- Fibers
- Fiber Amplifiers
- Other Products

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

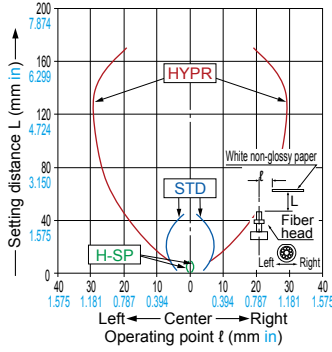
SENSING CHARACTERISTICS (TYPICAL)

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

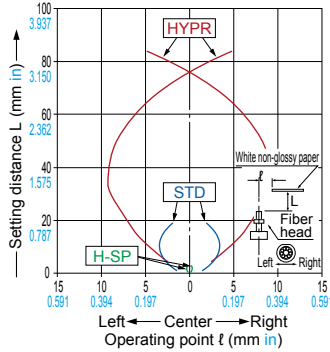
FD-R31G Reflective type



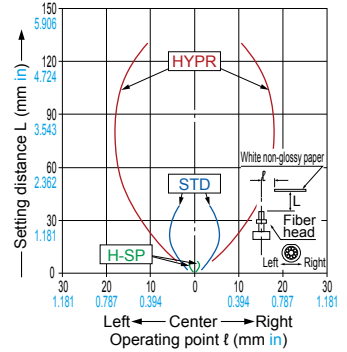
FD-R32EG Reflective type



FD-R33EG Reflective type

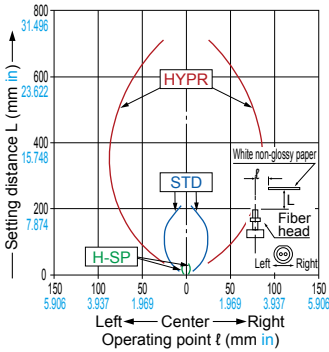


FD-R34EG Reflective type

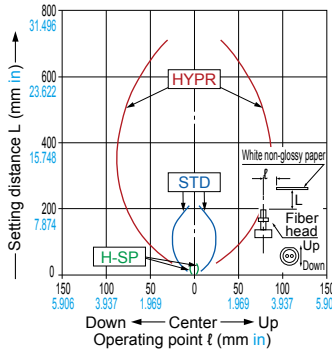


FD-R41 Reflective type

Horizontal direction

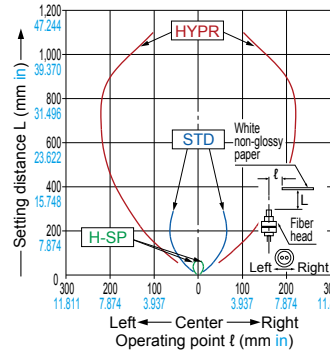


Vertical direction

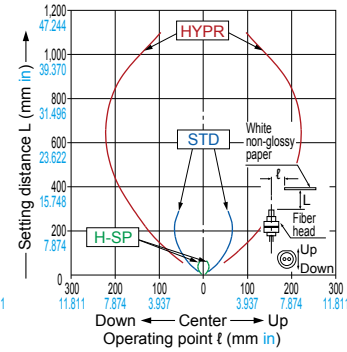


FD-R60 Reflective type

Horizontal direction

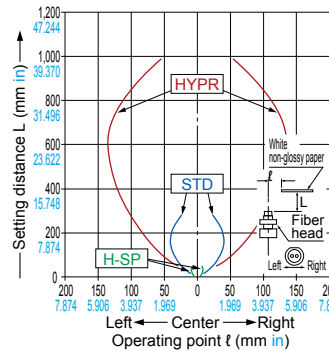


Vertical direction

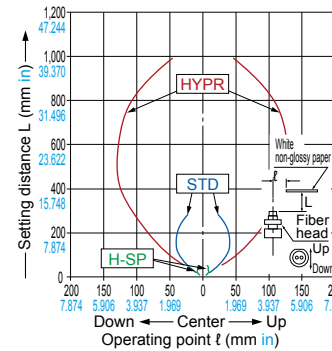


FD-R61Y Reflective type

Horizontal direction

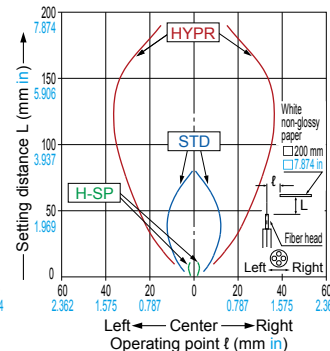


Vertical direction

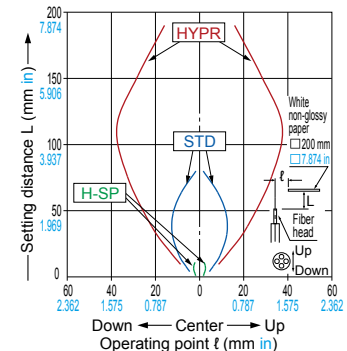


FD-S21 Reflective type

Horizontal direction

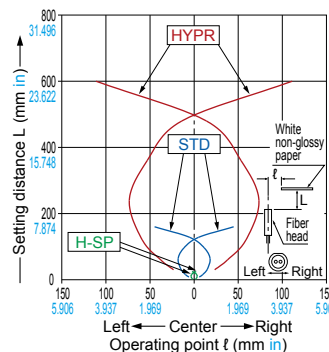


Vertical direction

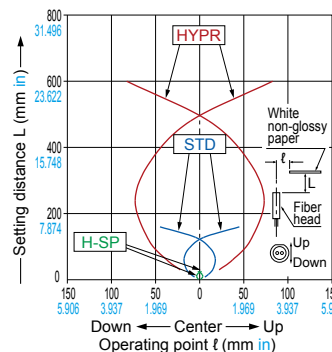


FD-S30 Reflective type

Horizontal direction

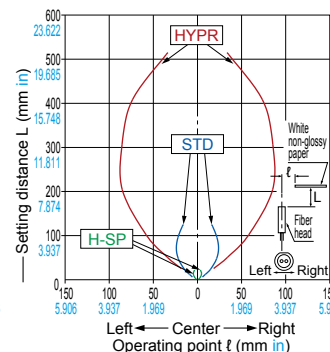


Vertical direction

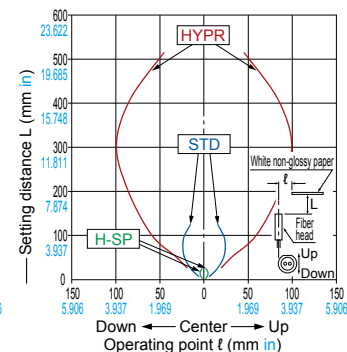


FD-S31 Reflective type

Horizontal direction



Vertical direction



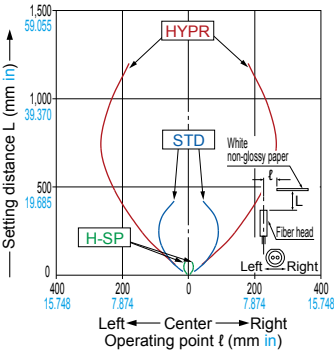
SENSING CHARACTERISTICS (TYPICAL)

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

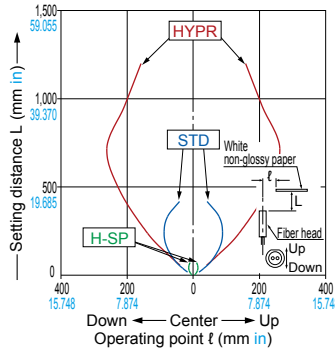
FD-S32

Reflective type

Horizontal direction



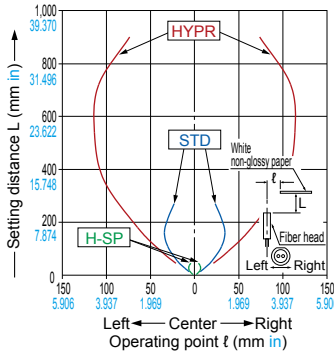
Vertical direction



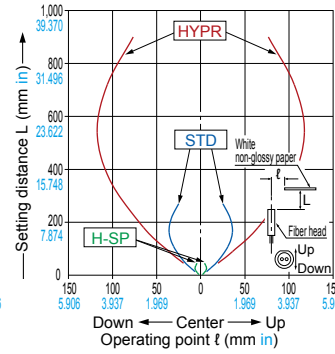
FD-S32W

Reflective type

Horizontal direction

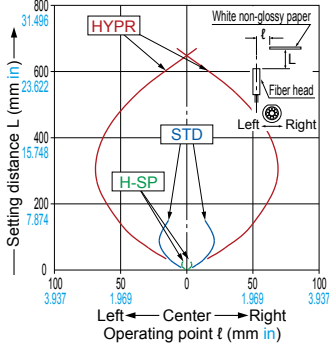


Vertical direction



FD-S33GW

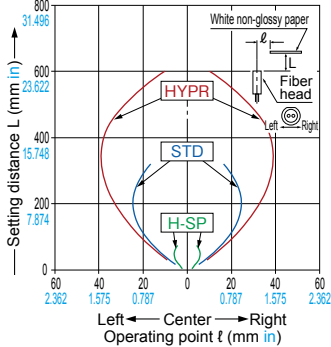
Reflective type



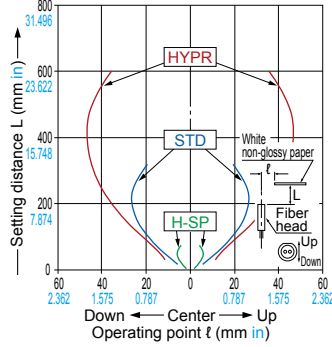
FD-S60Y

Reflective type

Horizontal direction



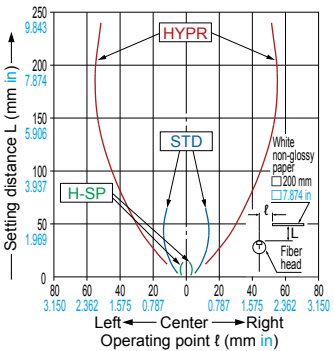
Vertical direction



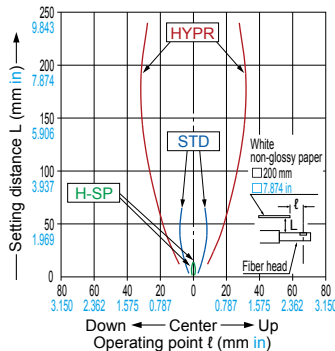
FD-V30

Reflective type

Horizontal direction



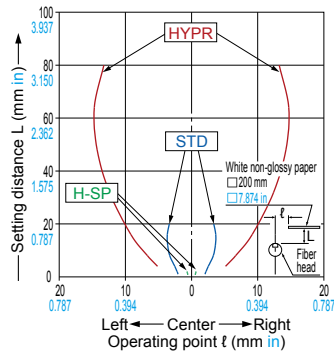
Vertical direction



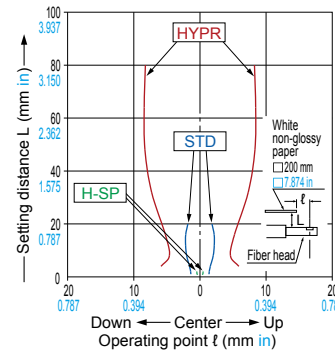
FD-V30W

Reflective type

Horizontal direction



Vertical direction



FX-500

FX-550

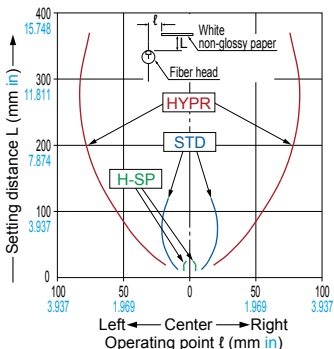
FX-100

FX-410

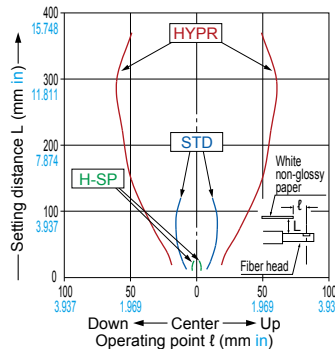
FD-V50

Reflective type

Horizontal direction



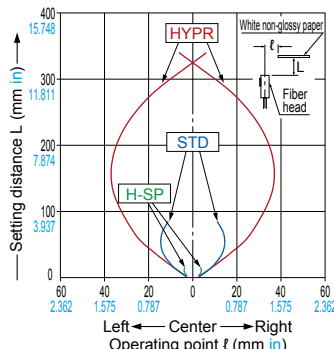
Vertical direction



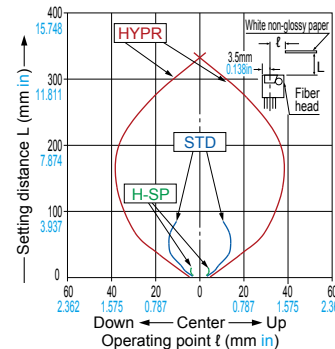
FD-Z20HBW

Reflective type

Horizontal direction



Vertical direction



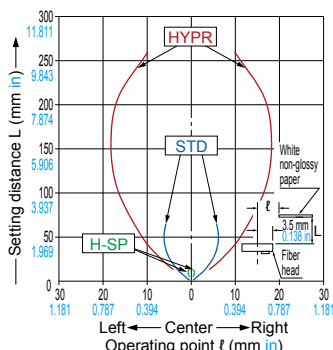
SENSING CHARACTERISTICS (TYPICAL)

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

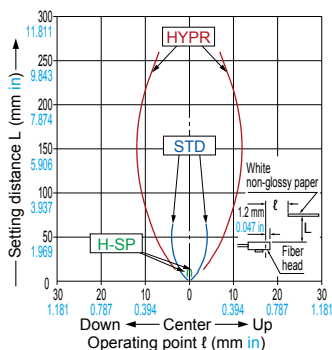
FD-Z20W

Reflective type

Horizontal direction



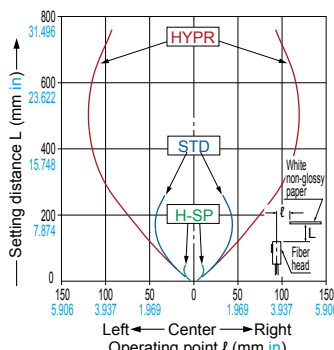
Vertical direction



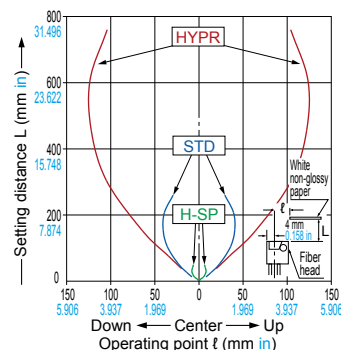
FD-Z40HBW

Reflective type

Horizontal direction



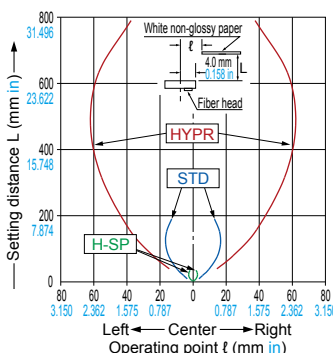
Vertical direction



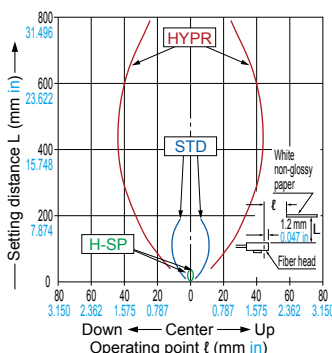
FD-Z40W

Reflective type

Horizontal direction



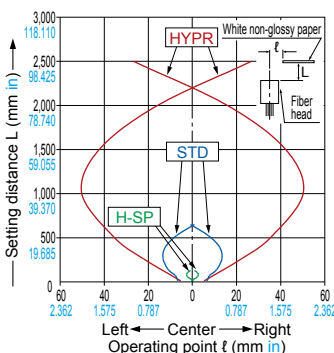
Vertical direction



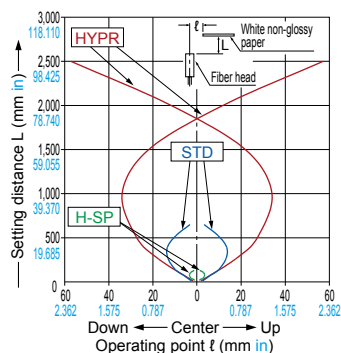
FD-Z50HW

Reflective type

Horizontal direction



Vertical direction



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.

- Make sure to use the quick-connection cable (optional) for the connection of the controller. Extension up to total 100 m **328.084 ft** is possible with 0.3 mm² or more, cable. However, in order to reduce noise, make the wiring as short as possible.
- Make sure that stress by forcible bending or pulling is not applied to the sensor cable joint and fiber cable.

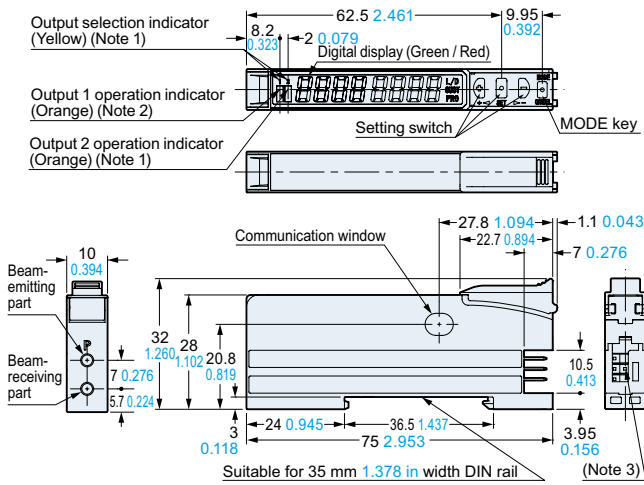
Others

- 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.

DIMENSIONS (Unit: mm in)

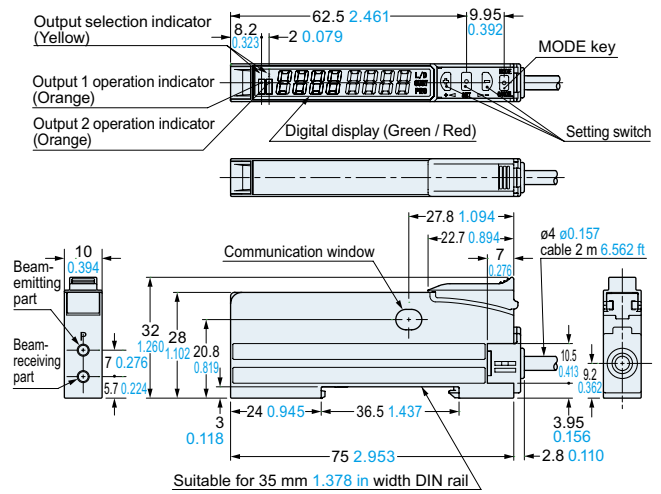
Refer to p.63~ for details of fiber dimensions.
The CAD data can be downloaded from our website.

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



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

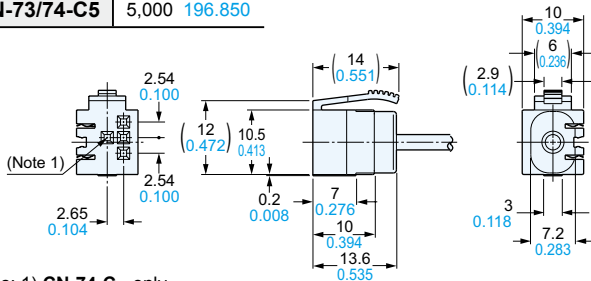
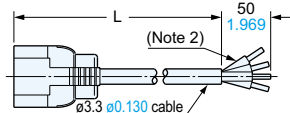
FX-505-C2 FX-505P-C2 Amplifier



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

• Length L

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

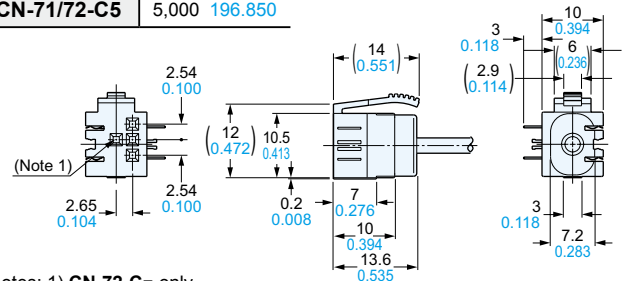
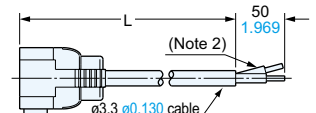


- Notes: 1) **CN-74-C□** only
2) **CN-73-C□**: 3-core

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

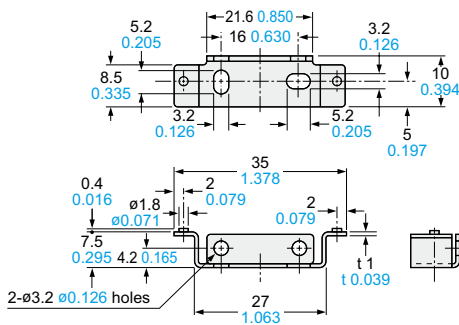
• Length L

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



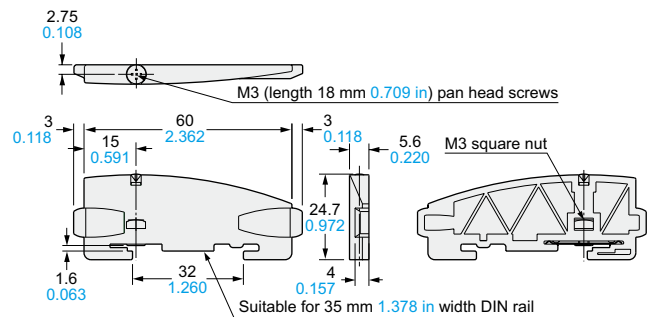
- Notes: 1) **CN-72-C□** only
2) **CN-71-C□**: 1-core

MS-DIN-2 Amplifier mounting bracket (Optional)



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

MS-DIN-E End plate (Optional)



Material: Polycarbonate