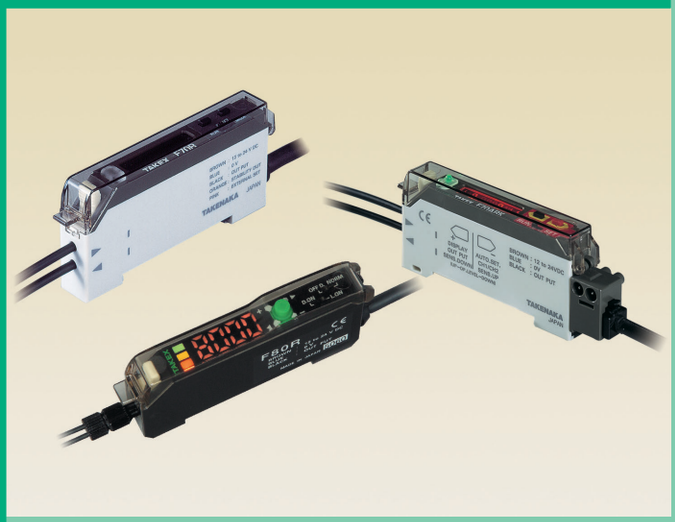
Fiber optic sensors



- F80R Series
- F70A Series
- F70 Series
- F71 Series
- Simplified Wiring K Series
- F70T Series
- F70V Series
- F71RAN
- F2R Series
- FLD1R
- F10R-AT
- Fiber Optic Cables

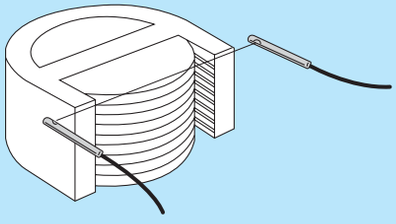
Fiber Optic sensors

List of models

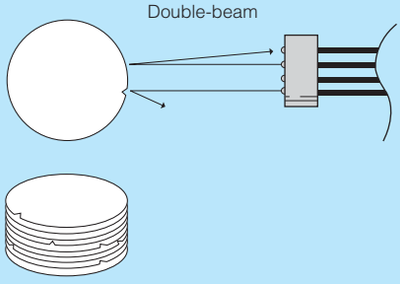
Type	Series	Appearance (typical example)	Overview/characteristics	See page
Fiber Optic Sensor with Digital display	F80R		• Simple operation, low-cost • Selectable between long-distance and high-speed modes according to purpose • Large digital display	4
Fiber Optic Sensor with Digital display	F70A		• Digital display • High-sensitivity/high-accuracy • Ultra-thin packaging	8
	F70		• Digital display of sensing information • Advanced functions for optimization • Ultra-thin packaging	10
Thin Fiber Optic Sensor with manual adjustment	F71		• Anti Interference feature allowing adjacent installation of up to 8 units • High accuracy 8-turn adjustment • Ultra-thin packaging	12
Fiber Optic Sensor with Simplified-wiring connection	F70A/F70 F71 K		• Simplified wiring • Connectible up to 16 units • Mixed use of different models within series available with no master/slave distinction • Space saving	18
Fiber Optic Sensor with Two-output amplifier	F70T		• Digital display of sensing information • Two-output/modes allows for various detection scenarios • Ultra-thin packaging	36
Fiber Optic Sensor with preset counter	F70V		• Equipped with two up/down preset counter circuits • Sensor on/off output and preset counter output provided	42
Fiber Optic Analog output amplifier	F71RAN		• Fine-adjustment of output achieved with 8-turn adjustment • Ultra-thin packaging	46
Fiber Optic Slim type amplifier	F2R		• Ultra-slim packaging • Only requiring space for cord • Low-cost	50
Fiber Optic Laser amplifier	FLD		• High-degree of accuracy achieved with red laser • Equipped with light emission stop function	54
Fiber Optic Pulse amplification type amplifier	F10R-AT		• Pulse amplification method used • Unaffected by background • Minute variation detected	56
Misselanious Fiber optic cables			• Various detection methods • Various applications/conditions	60
Characteristics tables (directional characteristics/distance-output characteristics)			• Displaying optimum use Configurations	140
Attachments			• For wider range of applications and more stable detection	158

Applications

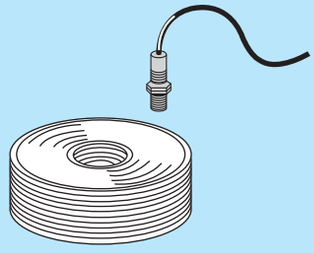
- Positioning of wafers



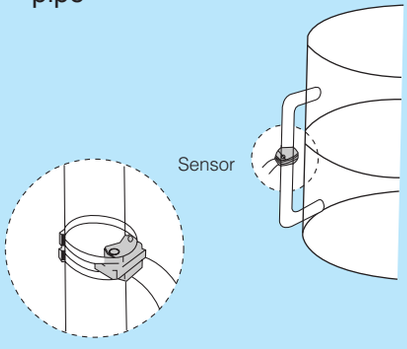
- 300-mm wafer mapping detection



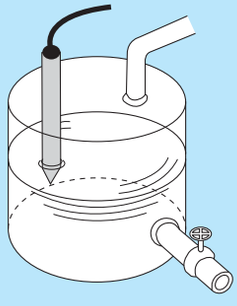
- Checking for upside-down CD-ROMs



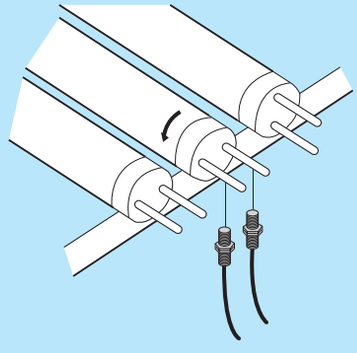
- Detection of level of liquid in pipe



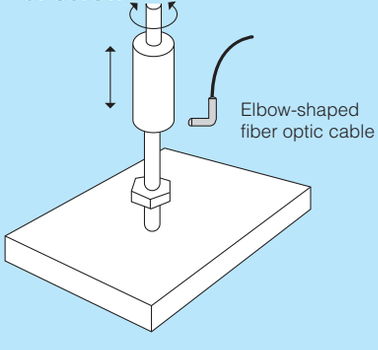
- Detection of level of liquid in tank



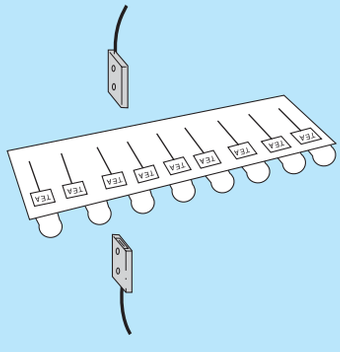
- Positioning of fluorescent tubes



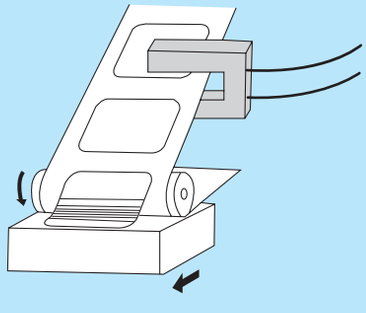
- Detection of screw-in amount of screw



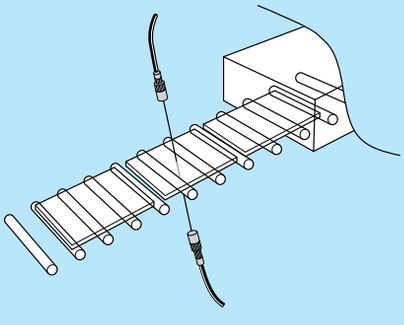
- Detection of teabag strings



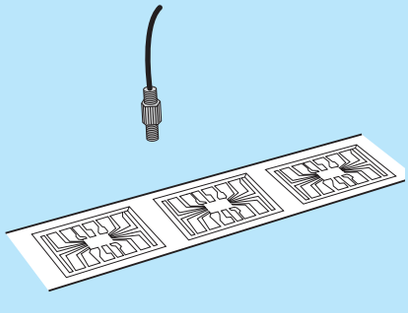
- Label detection



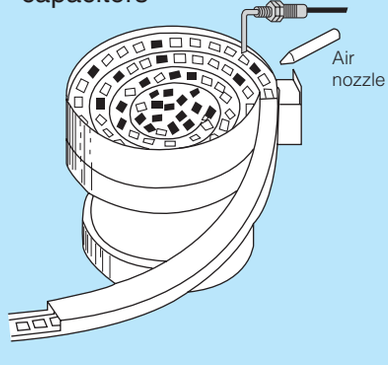
- Detection of glass plate at outlet of furnace



- Bad mark detection



- Distinction between sides of capacitors



F80R series

Digital display
Fiber optic sensors

- Simple operation and low cost design
- "Long-distance" mode for dramatically increased detecting distance
- "Received light" indication enlarged by about 8 times (compared with conventional Takex product)
- Larger digital display allows for simple adjustment
- Low power consumption achieved

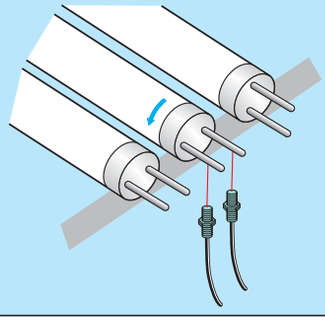
Type

Detection method/detecting distance	Model		Operation mode	Output mode	Light source
	NPN output	PNP output			
Dependent on fiber optic cable	**F80R**	**F80RPN**	Light-ON/Dark-ON selectable	Open collector	Red LED

Applications

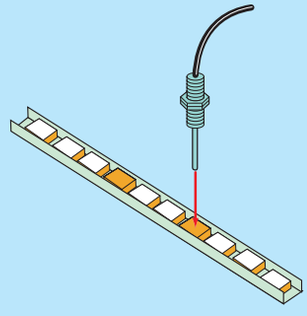
Positioning of fluorescent tubes

Electrodes detected for positioning prior to marking fluorescent tubes.



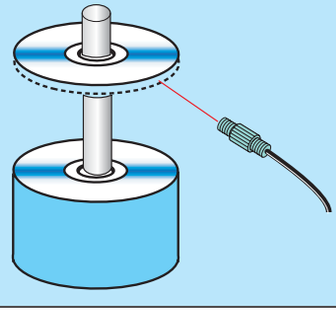
Checking for upside-down electronic components

Sides of electronic components determined on part chute.



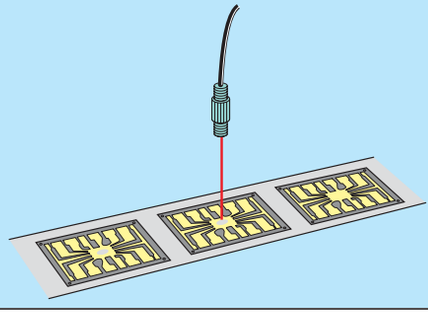
Detection of double feed of CDs

Detected from the side with small spot beam.



Checking of presence of silver paste

Small amount of paste detected with spot of 0.5 mm in diameter.



High-Speed, Long-Distance Capability

Swith selectable mode; between high speed and long distance according to the purpose of detection.

Switching between long-distance and high-speed modes

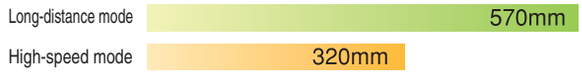
High-speed mode

Long-distance mode

Yellow LED in the middle illuminated to indicate long-distance mode

● Response time

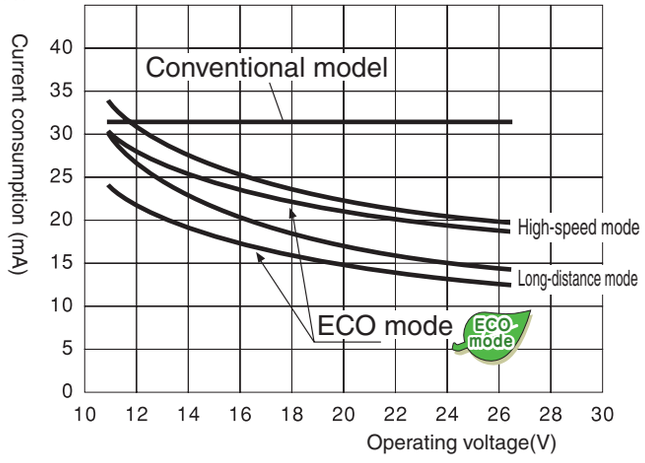
● Detecting distance (when combined with fiber optic cable FR105BC)



Low Power Consumption Achieved through Energy-Saving Design

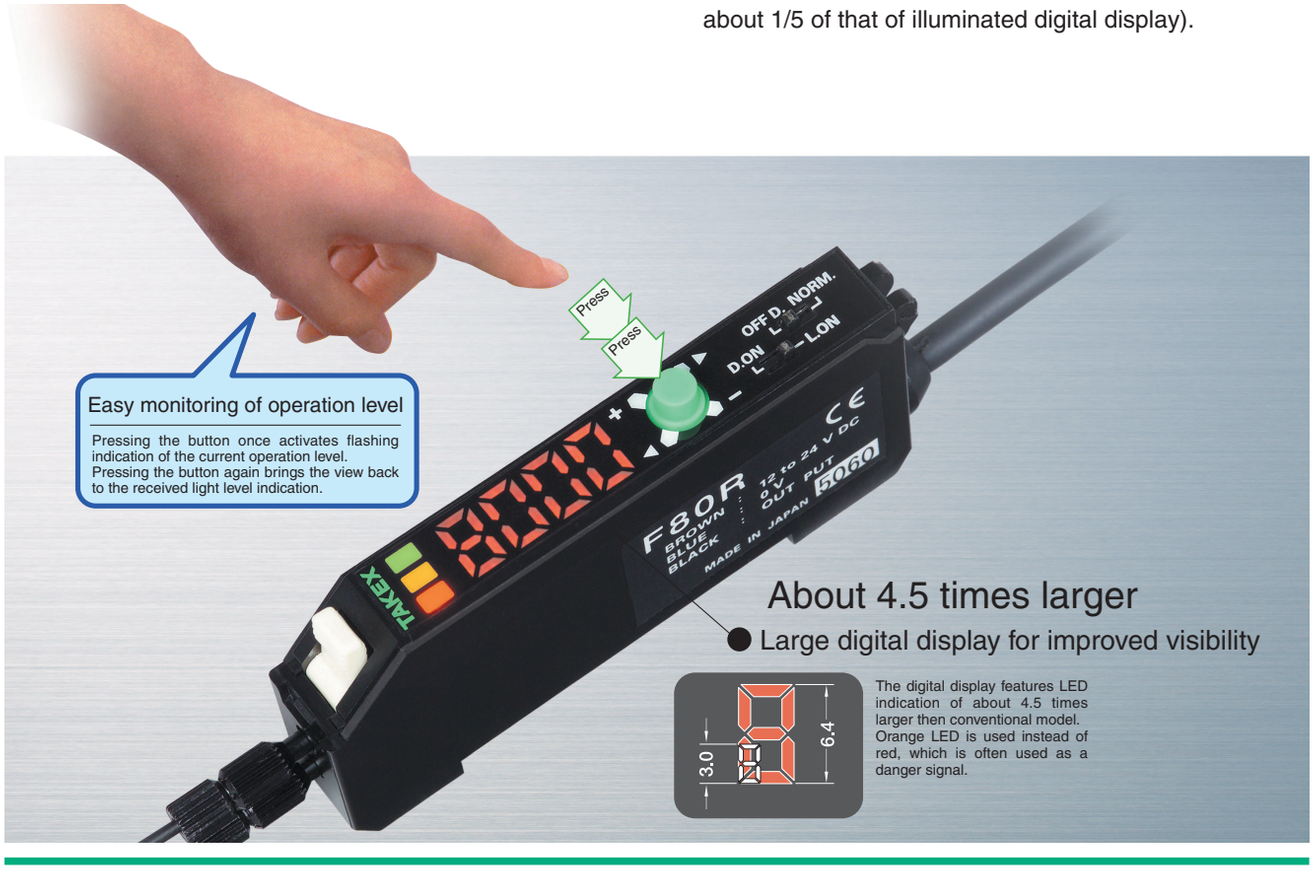
Power consumption comparison between F80 and conventional model

(Typical example)



- Lower power consumption of less than half of that of a conventional model (by utilizing ECO operation), achieving power consumption of about 15 mA at 24 V (in long-distance mode).
- Dark illumination enabled during normal operation, (when viewing of digital display tends to be less frequent, has reduced power consumption down to about 1/5 of that of illuminated digital display).

Simple Operation



F80R series

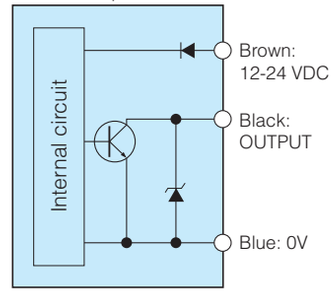
Rating/Performance/Specification

Rating/performance	Type	**NPN**output	**PNP**output
	Model	**F80R**	**F80RPN**
	Power supply	12-24V DC ±10% / Ripple 10% or less	
	Power consumption	650 mW max. (25 mA max. at 24 V)	830 mW max. (32 mA max. at 24 V)
	Output mode	NPN open collector Rating: sink current 100 mA (30 VDC max.) Residual voltage: 1 V or less	PNP open collector Rating: source current 100 mA (30 VDC max.) Residual voltage: 2 V or less
	Operation mode	Light-ON/Dark-ON selectable with sliding switch	
	Timer	Off delay/disabled selectable with sliding switch	
		Delay time: 45 ms fixed	
	Response time (*1)	High-speed mode: 190 µs s or less / Long-distance mode: 1.8 ms or less	
Specification	Light source (wavelength)	Red LED (680 nm)	
	Indicator	Operation indicator: orange LED / Mode indicator: yellow LED / Teaching indicator: green LED	
	Display	Received light level: 4 digits in orange LED (0-8000)	
	Switch	Output mode selector switch x 1 / Timer selector switch: 1 / Teaching and sensitivity adjustment push + 4-direction button switch x 1	
	Sensitivity setting	Full auto teaching / Auto teaching	
	Sensitivity adjustment function	Provided (manual sensitivity adjustment)	
	Protection circuit	Reverse connection protection / Short circuit protection /Serge absorption	
	Material	Polycarbonate	
	Wiring	Permanently attached cord (Outer dimension: dia.3.7) 0.2sq. 3 core 2m length	
	Mass	Approx. 60 g (including 2-m cord and mounting bracket)	
	Accessory	Mounting bracket / Operation manual	

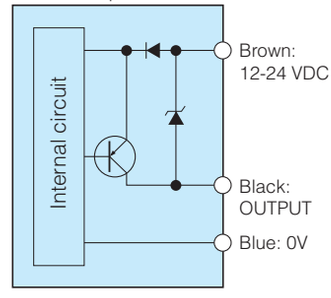
(*1) For initial setting and checking, output operation is disabled for about 1.5 seconds after power-up.
The operation mode factory setting is long-distance mode.

Input/Output Circuit and Connection

● NPN output



● PNP output



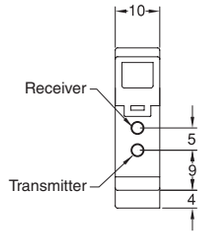
Environmental Specification

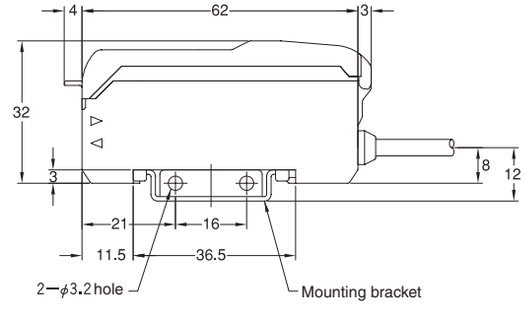
Environment	Ambient light	Illumination on light receiving surface: 3,500 lx (incandescent lamp)
	Ambient temperature	1-5 adjacent units in operation: –25 - +55 °C / Over 5 adjacent units in operation: –25 - +50 °C
		Storage: –40 - +70 °C (non-freezing)
	Ambient humidity	35-85%RH (non-condensing)
	Protective structure	IP40
	Vibration	10-55 Hz / 1.5 mm amplitude / 2 hours each in 3 directions
	Shock	500 m/s² / 3 times each in 3 directions

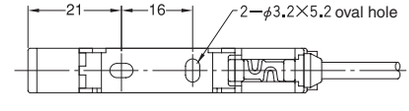
Dimensions (in mm)

Amplifier
Model: F80 Series

CAD



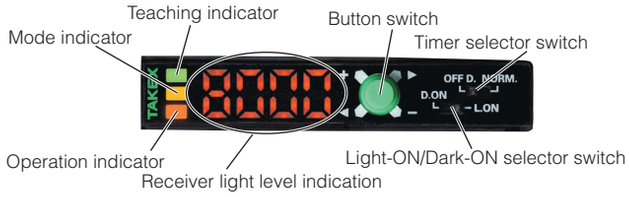




For Correct Use

Be sure to follow the instructions in the operation manual provided for correct use of the product.

●Operation panel



Teaching indicator (green LED) : Flashes/illuminated during teaching.

Mode indicator (yellow LED) : Illuminated when the long-distance mode is selected. Not illuminated in the high-speed mode.

Operation indicator (orange LED) : Illuminated when the output is activated.

Received light level indication : The received light level is indicated in a 4-digit number between 0 and 8000. The number indication is slow for ease of reading. For instantaneous light reception (or light blocking), even slower indication is given for the level of received light for light reception (or light blocking).
For an application in which the sensor output alternates between on and off consecutively, the levels of received light for light reception and blocking are alternately displayed.

ECO operation : The number indication is illuminated brightly immediately after power-up or during switch operation. When about 7 seconds have passed after power-up or end of switch operation, the number indication is dimmed and the mode enters the ECO operation state requiring less power.

Button switch : Used for teaching or sensitivity adjustment. The button can be pressed downwards and in 4 directions.

Timer selector switch : Switched for selecting the off-delay timer.
OFFD. : Off delay timer enabled
NORM. : Timer disabled

Light-ON/Dark-ON selector switch : Selects an output mode.
L.ON : Light-ON (output activated when light is received)
D.ON : Dark-ON (output activated when light is blocked)
When the mode is switched with the power on, turn off the power once and back on or manually repeat turning on and off.

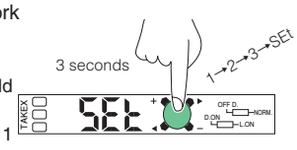
●Sensitivity setting

■The setting condition is displayed after sensitivity setting has been completed:

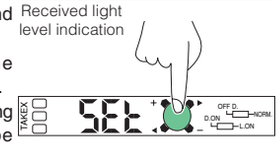
good [Good]	Optimum teaching achieved.
high [High]	Maximum sensitivity set.
HArd [Hard]	The hysteresis is small and the setting is severe. This indication is also given for positioning teaching.
SAtu [Saturated]	The power is too high and the teaching condition is not optimum. Replacing with a thinner fiber optic cable is recommended when a thick cable is used. Use in the high-speed mode is recommended when the long-distance mode is selected.

■Sensitivity setting using stationary work
<auto teaching>
[Reflective type]

①With no work placed, press and hold down the button for 3 seconds.
The indication rotates in the order of 1→2→3→SEt.
When SEt appears, release the button.

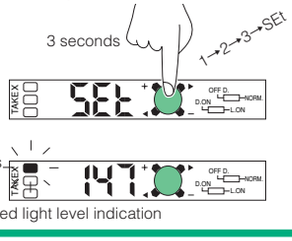


②Place the work in a given position and press the button.
When SEt appears, release the button to complete sensitivity setting.
[Note] The steps in the sensitivity setting process described above may be reversed by pressing the button first with the work placed.

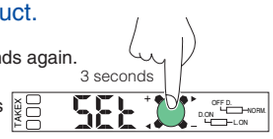


■Sensitivity setting using moving work
<full auto teaching>

①Press and hold down the button for 3 seconds.
The indication rotates in the order of 1→2→3→SEt.
When SEt appears, release the button.



②Press and hold the button for 3 seconds again.



・SEt is shown while the button is held down.
・Release the button when Auto appears.

③The LEDs alternately flash to indicate activation of full auto teaching. Let the work pass in this condition. There is no time limit.

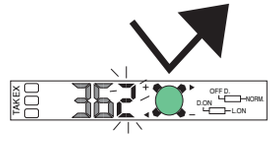
④Press the button to complete sensitivity setting.

■Maximum sensitivity setting
[Through-beam type]
Use a work, etc. to black the light. Set the sensitivity in this condition.
[Reflective type]
Use of a reflective-type fiber optic cable at the maximum sensitivity may cause inadequate light blocking. Be sure to use a work for sensitivity setting.

●Sensitivity adjustment (manual adjustment of activation level)

<The value for the flashing number can be changed by pressing the button.>

①Press the button once.
The current activation level appears, allowing changing of the flashing number.

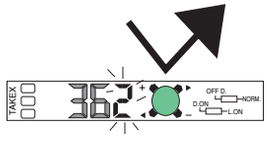


・Pressing in the + direction increases the activation level = SENS DOWN.
・Pressing in the − direction decreases the activation level = SENS UP
[Note] Holding down the button changes the indication faster.
・Pressing the button in the ▲ or ▼ direction shifts the active digit .

②When the adjustment is finished, press the button once to complete sensitivity setting.

●Activation level checking (for finding the current activation level)

①Press the button once.
The number flashes and the activation level is shown.

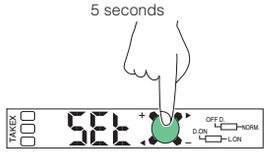


・For Light-ON, the value for the level that activates the output for light reception is displayed.
・For Dark-ON, the value for the level that activates the output for light blocking is displayed.

②Press the button once to complete sensitivity setting.

●Switching between the long-distance and high-speed modes

Press and hold down the button for about 5 seconds.
When Long or H-SP appears on the display, release the button to complete switching.



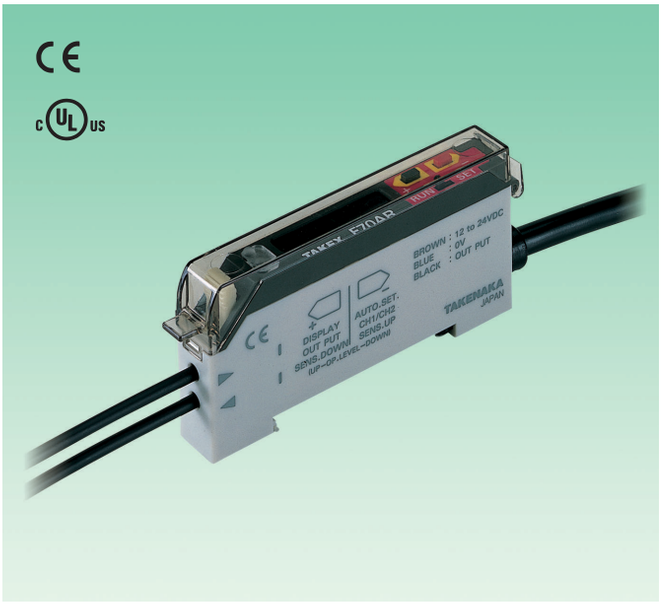
High-speed mode

Long-distance mode

Yellow LED in the middle illuminated to indicate long-distance mode

F70A series

Digital display
Fiber optic sensors



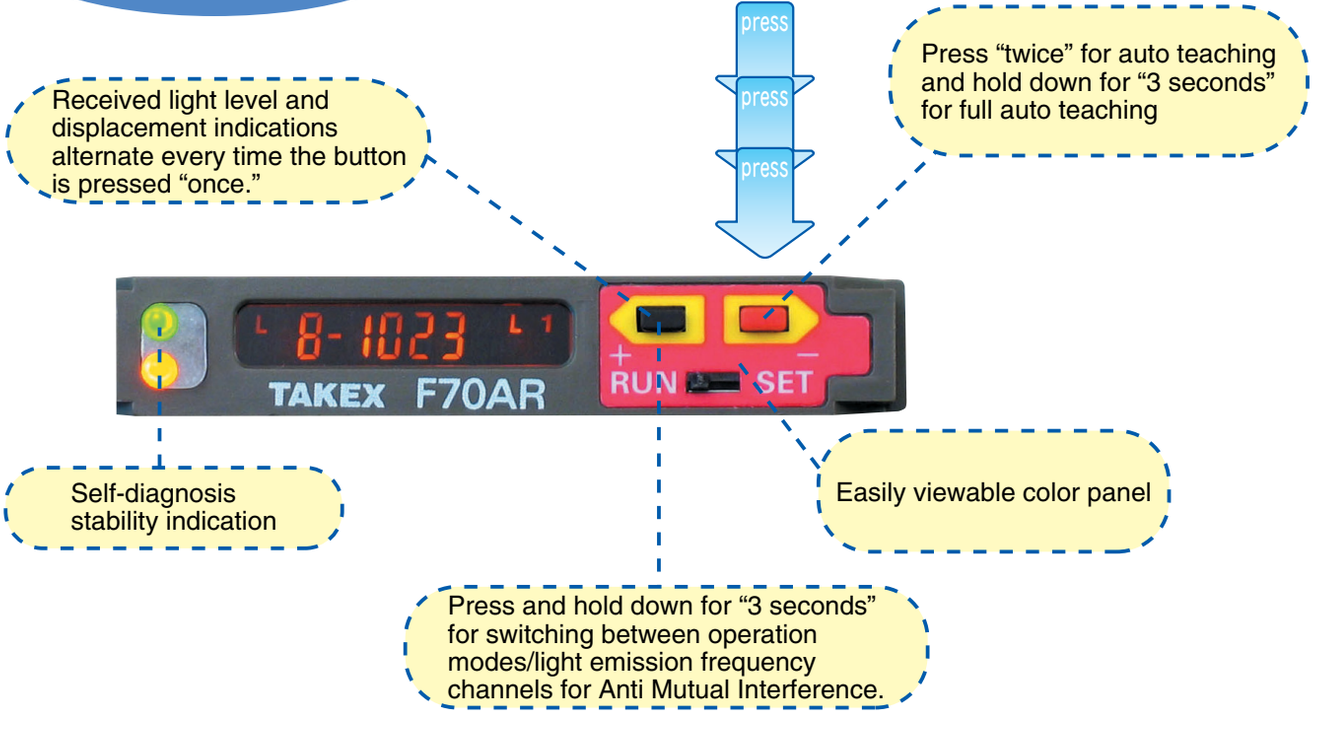
- Digital indication of sensing information
- Simple operation for setting functions
- Direct reading of stablility level is available along with received light level and displace-ment indications
- LCD with backlight for ease of reading
- Various convenient functions provided
  - Full auto/auto teaching
  - Anti Mutual Interference
  - Manual sensitivity setting
  - Off-delay timer

Variation

Type	Model		Light source	Output mode
	NPN output	PNP output		
Digital display general-purpose type	**F70AR**	**F70ARPN**	Red LED	Open collector (NPN/PNP)
	F70AG	**F70AGPN**	Green LED	
	F70AB	**F70ABPN**	Blue LED	
	F70AW	**F70AWPN**	White LED	

Simple operation

Simple operation featured



2 types of received light level indication

Level indication mode

The level of received light is indicated in 4-digit number.
Min. = 0 / Max. = 1023

Position on the electronic volume: 8

The sensitivity position on the electronic volume and the current received light level are displayed.

There may be an error of ± 1-2 between the value on the LCD and the actual value.

Displacement indication mode

The example above shows that the current receive light level is -123 with reference to the activation level.

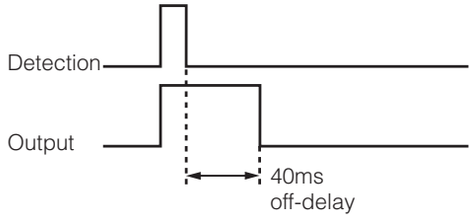
The level of received light is indicated in positive or negative value with reference to the activation level.

The activation level is taken as the reference (± 0) and the level of received light with work used is indicated as a deviation from the reference in a positive or negative value.

Enhanced teaching features (sensitivity setting)

- **Full auto teaching**
  Simply pressing the button allows easy teaching; even for an object moving at a high speed.
- **Auto teaching**
  2-point teaching “with” and “without” the work allows the detection of slight level difference such as the thickness of a piece of work and the presence of a film.
- **Position teaching**
  This feature is ideal for high-accuracy positioning that requires accurate determination of a detecting point.
- **Maximum sensitivity setting**
  For applications requiring maximum sensitivity setting such as the detection of work with a through-beam type fiber optic cable, the extra-powerful light allows for use in an adverse environment.
- **Manual setting**
  Arbitrary manual increase and decrease of a “set-point” allows level setting while checking the operation.

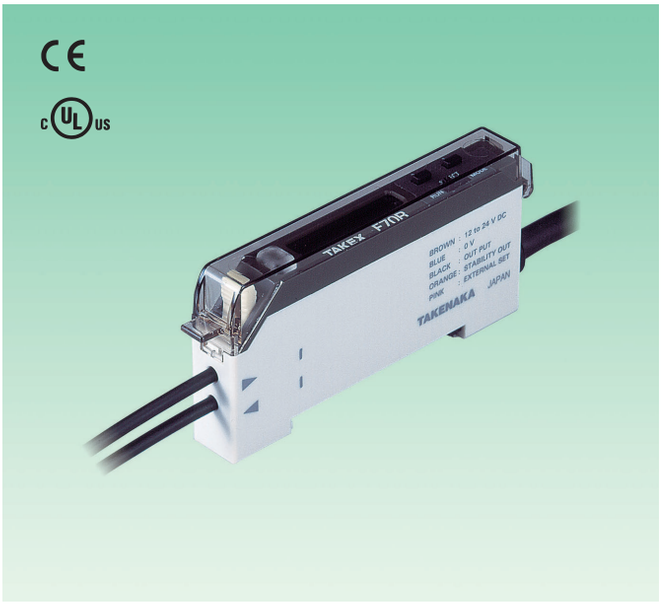
Secure detection of an instantaneous signal is ensured with the off-delay timer



A small object moving at a high speed can be securely detected, thus allowing for a wider range of input conditions for the connected devices.

F70 series

Digital display
Fiber optic sensors



- Digital indication of sensing information
- Various advanced functions provide for optimum use of the sensor
- Unparalleled “high resolution” allows highly accurate detection
- LCD with backlight for ease of reading
- Longer detecting distance
  (about 2-X that of a conventional Takex model)

Variation

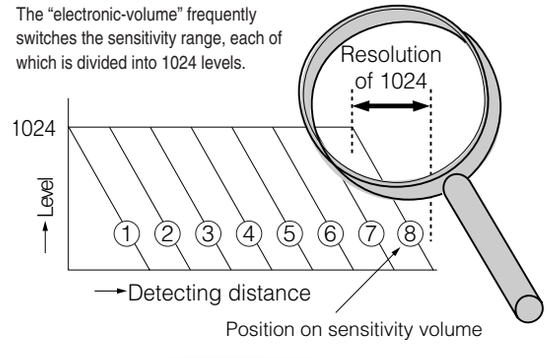
Type	Model		Light source	Output mode
	NPN output	PNP output		
Digital display high-performance type	**F70R**	**F70RPN**	Red LED	Open collector (NPN/PNP)
	F70G	**F70GPN**	Green LED	
	F70B	**F70BPN**	Blue LED	
	F70W	**F70WPN**	White LED	

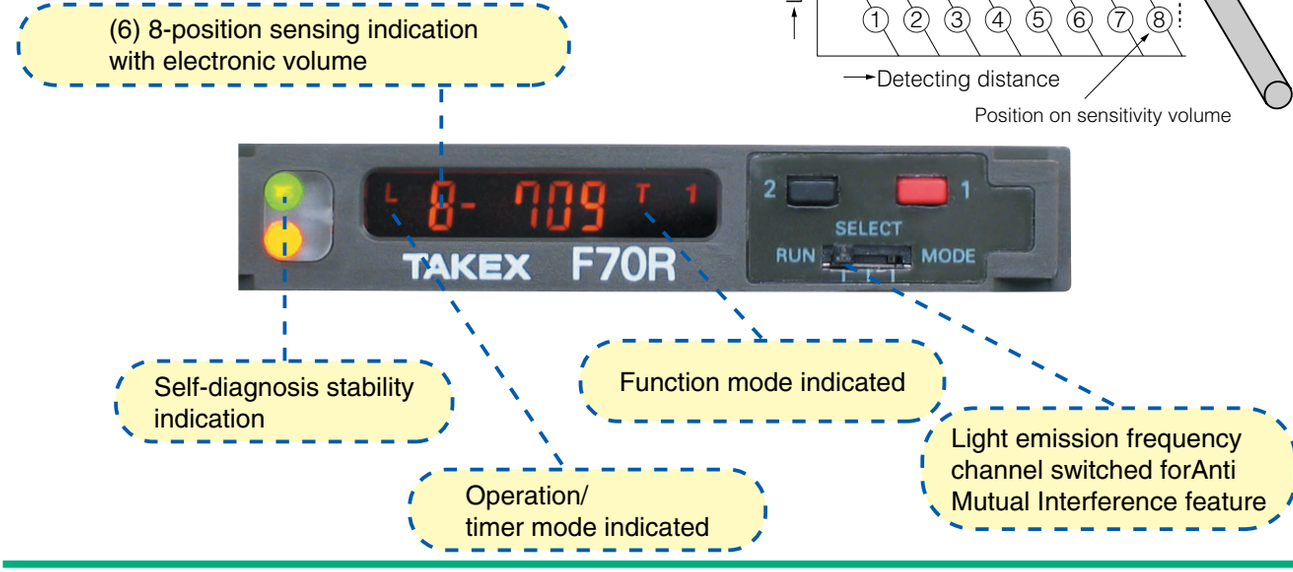
Excellent detection performance

Buitl-in high-resolution provides highly accurate detection

Wide dynamic range and high resolution are achieved at the same time

High resolution is maintained even with a wide dynamic range. The provided electronic volume feature has both a wide dynamic range and high resolution.

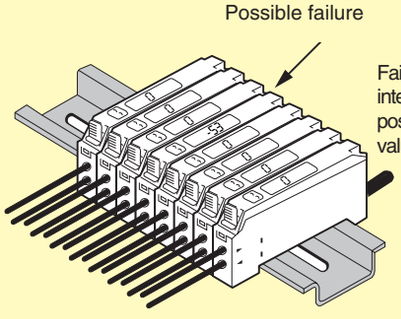




Display function :(beyond received light level)

Displacement indication function

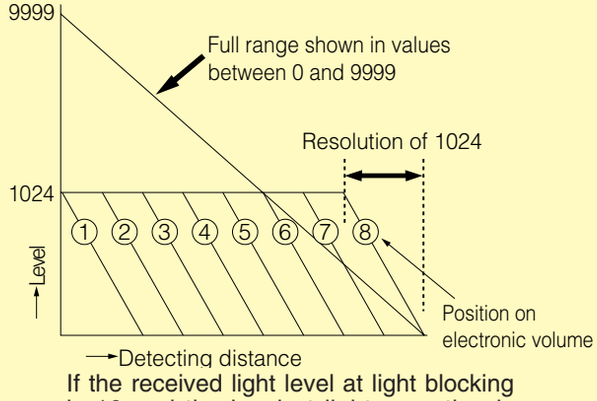
All amplifiers should show “0” with no work.



The value for a deviation (positive or negative) of received light level from the original level is shown at the time of detection, which allows central management of sensors.

Absolute value indication

Received light level indication going beyond the



If the received light level at light blocking is 10 and the level at light reception is 6000, the light blocking / light reception ratio is calculated as 600 times.

supporting high resolution

Enhanced teaching features (sensitivity setting)

- **Full auto teaching**
  Simply pressing the button allows easy teaching of an object moving at a high speed.
  The teach hold feature allows indication of the maximum and minimum data.
- **Auto teaching**
  2-point teaching with and without the presence of work, allows the detection of slight level differences such as the thickness of a piece of work and/or the presence of a film.
- **Positioning teaching**
  This feature is ideal for high-accuracy positioning that requires accurate determination of a detecting point.
- **Maximum sensitivity setting**
  For applications requiring a “maximum” sensitivity setting such as the detection of work with a through-beam type-fiber optic cable. The incorporated extra powerful light would allow use in an adverse environment.
- **Manual setting**
  Arbitrary manual increase and decrease of a set-point level allows level setting while checking the operation.

Auto sensing function compensates for adverse environment

The level of received light is constantly monitored and fluctuation is detected and automatically adjusts the activation/deactivation level.
Stable detection at optimum sensitivity is ensured even if the received light level frequently fluctuates due to dust or water drops.

Manual hysteresis setting feature

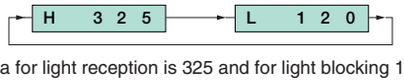
The hysteresis can be arbitrarily set according to the application, allowing setting of a small hysteresis for severe, high-accuracy detection and a large hysteresis for detection of large variation and prevention of chattering.

Timer functions

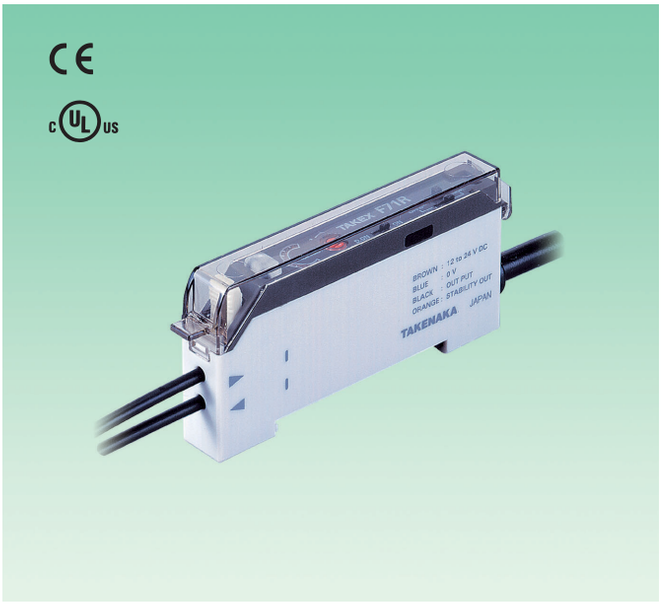
On-delay, off-delay and on-off delay timer functions are provided, which allows for a wide range of detecting and input conditions from the connected devices.
The delay time setting is variable between:
10 ms, 20 ms, 40 ms, 60 ms, 80 ms, 100 ms and 120 ms.

Teach hold function

The sensor has the ability to hold instantaneous data for an object moving at a high rate of speed during full auto teaching. This data is displayed when the teaching has been completed.



(Data for light reception is 325 and for light blocking 120.)



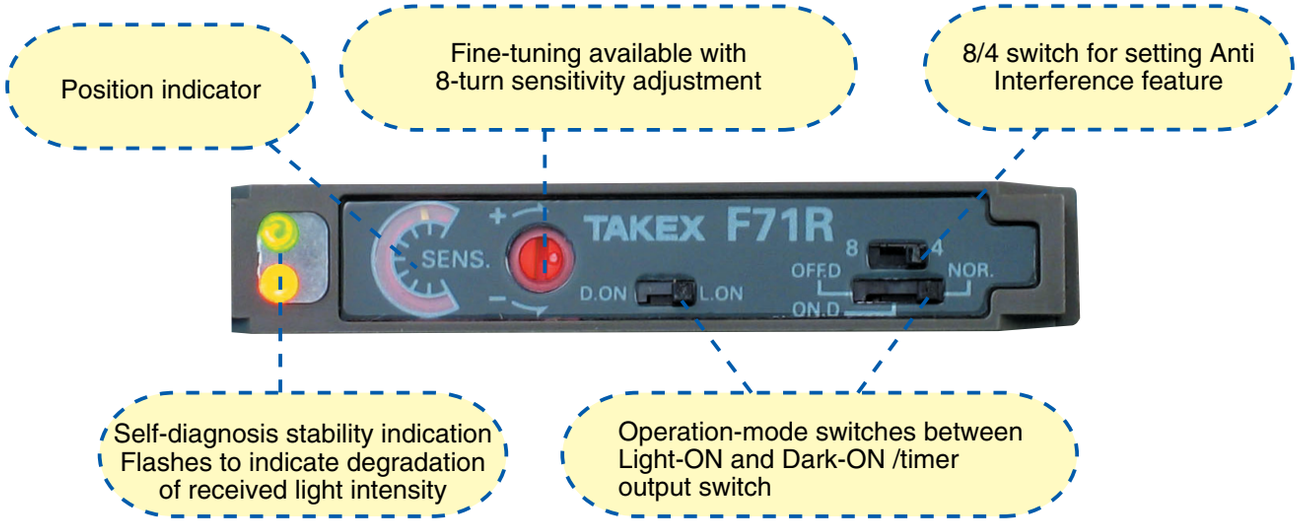
- Adjacent installation of up to 8 units
  - Proprietary Anti Interference feature is used -
- High-accuracy-8-turn sensitivity adjustment
  - Position indicator is provided -
- High-speed response of 30 μs
  - H type sensor -

Variation

Type	Model		Light source	Output mode
	NPN output	PNP output		
Manual setting general-purpose type	**F71R**	**F71RPN**	Red LED	Open collector (NPN/PNP)
	F71G	**F71GPN**	Green LED	
	F71B	**F71BPN**	Blue LED	
	F71W	**F71WPN**	White LED	
Manual setting high-speed type	**F71RH**	**F71RHPN**	Red LED	
	F71GH	**F71GHPN**	Green LED	
	F71BH	**F71BHPN**	Blue LED	
	F71WH	**F71WHPN**	White LED	

Manual high performance model

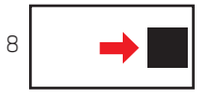
High-accuracy 8-turn adjustment is equipped with a position indicator, which allows direct reading of the adjustment position.



Useful 8-unit detection

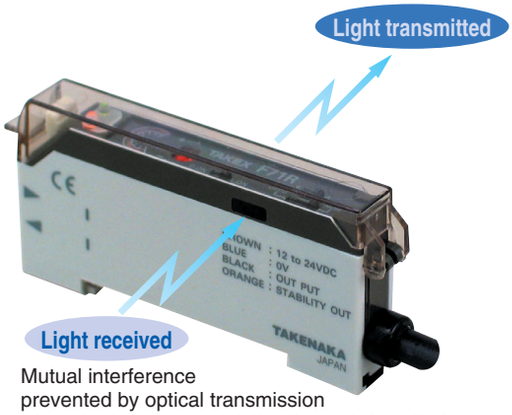
Optical transmission-type Anti Interference feature

The Anti Interference feature prevents false operation due to mutual interference even if up to 8 units are installed adjacently.



Anti Interference for up to 4 sensors (response time: 250 μs)

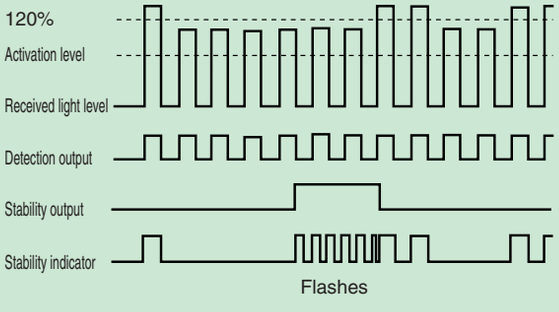
Anti Interference for up to 8 sensors (response time: 500 μs, turbo function enabled)



Mutual interference prevented by optical transmission when more than one unit is adjacently installed.

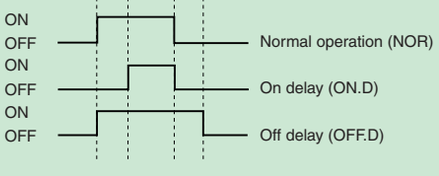
Easy-to-understand stability function

When four consecutive detections with a received light level of 120% or lower of the activation level have occurred, the stability output is activated. At the same time, the stability indicator flashes an alert.



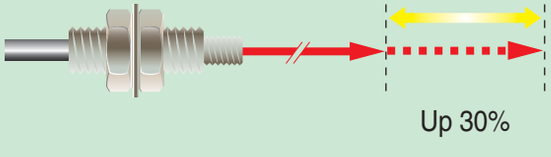
Timer operation

A delay timer of about 40 ms is provided to allow for a range of input conditions of the connected devices.
The timer is also useful for stabilization of detection output such as canceling signal chattering.



Turbo function increases detecting distance by 30%

When it is desirable to increase the detecting distance for the current condition of use, enabling the turbo function allows a distance increase of about 30%.



F70A · F70series

Type

• Amplifier (main unit)

Type	Model		Light source	Output mode	Connection
	NPN output	PNP output			
Digital display general-purpose type	**F70AR**	**F70ARPN**	Red LED	Open collector (NPN/PNP)	Permanently attached cord (M8 connector type also available)
	F70AG	**F70AGPN**	Green LED		
	F70AB	**F70ABPN**	Blue LED		
	F70AW	**F70AWPN**	White LED		
Digital display high-speed type	**F70R**	**F70RPN**	Red LED		
	F70G	**F70GPN**	Green LED		
	F70B	**F70BPN**	Blue LED		
	F70W	**F70WPN**	White LED		

• Fiber optic cable

For different types of fiber optic cables, see pp. 59-.

• M8 connector type

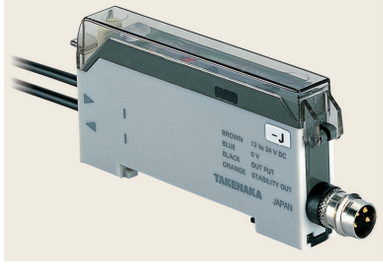
M8 connector connection type is separately available for all models, which is identified by “-J” following the model number. “-JE” and “-JS” are available depending on the input/output specification.

For connector specifications, see p. 23.

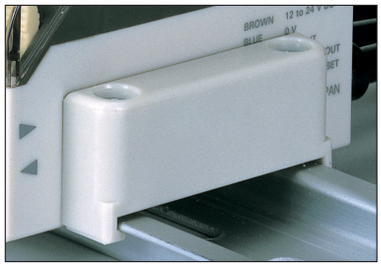
<Type of cords with M8 connector>

・Model：FBC-4R2S (equipped with straight M8 connector and 2-m cord)

・Model：FBC-4R2L (equipped with angled M8 connector and 2-m cord)



End unit



• Optional parts

Type	Model	Description
End unit	**FA7EU**	DIN rail mounting stopper
Mounting bracket*	**AC-BF2**	Amplifier unit mounting bracket

*Accessory

Rating/Performance/Specification

Rating/performance	Model	NPN type	F70AR	F70AG	F70AB	F70AW	F70R	F70G	F70B	F70W
		PNP type	F70ARPN	F70AGPN	F70ABPN	F70AWPN	F70RPN	F70GPN	F70BPN	F70WPN
	Power supply		12-24V DC ±10% / Ripple 10% max.							
	Current consumption	NPN type	39 mA max.							
		PNP type	50 mA max.							
	Output mode	Control output (*) NPN type	Open collector output / Rating: sink current 100 mA (30 VDC max.) / Residual voltage: 1 V or less							
		Control output (*) PNP type	Open collector output / Rating: source current 100 mA (30 VDC max.) / Residual voltage: 2 V or less							
		Stability output (*) NPN type	———				Open collector output / Rating: sink current 50 mA (30 VDC max.) / Residual voltage: 1 V or less			
		Stability output (*) PNP type					Open collector output / Rating: source current 50 mA (30 VDC max.) / Residual voltage: 2 V or less			
	Operation mode		Light-ON/Dark-ON selectable							
	Timer		Off delay/disabled selectable Delay time: 40 ms fixed				On delay/off delay/on-off delay/disabled selectable Delay time: selectable between 10, 20, 40, 60, 80, 100 and 120 ms / Default: 40 ms			
	Response time		Light emission frequency channel 1: 600 μs max. Light emission frequency channel 2: 700 μs max.				Light emission frequency channel 1: 500 μs max. Light emission frequency channel 2: 600 μs max.			
Specification	Light source (wavelength)		Red LED (660mm)	Green LED (525mm)	Blue LED (470mm)	White LED	Red LED (660mm)	Green LED (525mm)	Blue LED (470mm)	White LED
	Indicator		Operation indicator: orange LED / Stability (STB) indicator: green LED							
	Display		LCD display with backlight							
	Switch		2 set buttons / Mode selector switch: RUN/SET				2 set buttons / Mode selector switch: RUN/SELECT/MODE			
	Sensitivity setting		Full auto teaching / Auto teaching							
	Sensitivity setting input		Set button input				Set button input/external input			
	Sensitivity adjustment function		Provided (manual sensitivity adjustment)							
	Functions		• Anti Mutual Interference feature • Short circuit protection feature				• Sensor function: AUTO/TEACH/LOCK • Auxiliary function: S for manual adjustment of sensitivity and activation level H for manual hysteresis setting V for displacement indication and absolute value indication modes • Anti Mutual Interference feature • Self-diagnosis feature • Short circuit protection feature			
	Material		Polycarbonate							
	Connection		Permanently attached cord (outer dimension: dia. 4.8) 0.2sq. 3 core 2 m length				Permanently attached cord (outer dimension: dia. 4.8) 0.2sq. 5 core 2 m length			
			For M8 connector specifications, see p. 23.							
	Mass		Approx. 80 g (including 2-m cord and mounting bracket)							
	Accessory		Mounting bracket / Operation manual							

(*) Avoid the transient condition (0.5 seconds) immediately after power-up for output.

Environmental Specification

Environment	Ambient light	Incandescent lamp: 10,000 lx / Sunlight: 20,000 lx
	Ambient temperature	1-3 adjacent units in operation: −25 - +55 °C 4-10 adjacent units in operation: −25 - +50 °C 11-16 adjacent units in operation: −25 - +45 °C Storage: −40 - +70 °C (non-freezing)
	Ambient humidity	35-85%RH (non-condensing)
	Protective structure	IP40
	Vibration	10-55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction
	Shock	500 m/s² / 3 times each in 3 directions

F71 series

Type

• Amplifier (main unit)

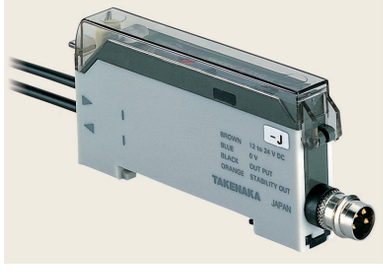
Type	Model		Light source	Output mode	Connection
	NPN output	PNP output			
Manual setting general-purpose type	**F71R**	**F71RPN**	Red LED	Open collector (NPN/PNP)	Permanently attached cord (M8 connector type also available)
	F71G	**F71GPN**	Green LED		
	F71B	**F71BPN**	Blue LED		
	F71W	**F71WPN**	White LED		
Manual setting high-speed type	**F71RH**	**F71RHPN**	Red LED		
	F71GH	**F71GHPN**	Green LED		
	F71BH	**F71BHPN**	Blue LED		
	F71WH	**F71WHPN**	White LED		

• Fiber optic cable

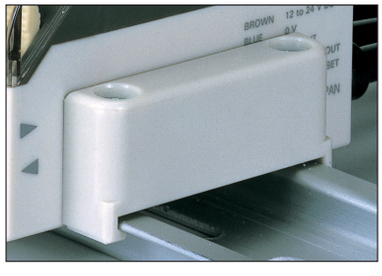
For different types and prices of fiber optic cables, see pp. 59-.

• M8 connector type

M8 connector connection type is separately available for all models.
For identification, “-J” follows the model number.
For connector specifications, see p. 23.
<Type of cords with M8 connector>
・Model：FBC-4R2S (equipped with straight M8 connector and 2-m cord)
・Model：FBC-4R2L (equipped with angled M8 connector and 2-m cord)



End unit



• Optional parts

Type	Model	Description
End unit	**FA7EU**	DIN rail mounting stopper
Mounting bracket*	**AC-BF2**	Amplifier unit mounting bracket

*Accessory

Rating/Performance/Specification

Rating/performance	Model	NPN type	F71R	F71G	F71B	F71W	F71RH	F71GH	F71BH	F71WH
		PNP type	F71RPN	F71GPN	F71BPN	F71WPN	F71RHPN	F71GHPN	F71BHPN	F71WHPN
	Power supply		12-24V DC ±10% / Ripple 10% max.							
	Current consumption	NPN type	35 mA max.							
		PNP type	40 mA max.							
	Output mode: Control output (*)	NPN type	Open collector output / Rating: sink current 100 mA (30 VDC max.) / Residual voltage: 1 V or less							
		PNP type	Open collector output / Rating: source current 100 mA (30 VDC max.) / Residual voltage: 1 V or less							
	Output mode: Stability output (*)	NPN type	Open collector output / Rating: sink current 100 mA (30 VDC max.) / Residual voltage: 1 V or less							
		PNP type	Open collector output / Rating: source current 100 mA (30 VDC max.) / Residual voltage: 1 V or less							
	Operation mode		Light-ON/Dark-ON selectable							
	Timer		On delay/off delay/disabled selectable Delay time: about 40 ms fixed							
	Response time		With switch at 4 (turbo function disabled): 250 μs max. With switch at 8 (turbo function enabled): 500 μs max.				30 μs max. (*1)			
Specification	Light source (wavelength)		Red LED (660mm)	Green LED (525mm)	Blue LED (470mm)	White LED	Red LED (660mm)	Green LED (525mm)	Blue LED (470mm)	White LED
	Indicator		Operation indicator: orange LED / Stability (STB) indicator: green LED							
	Volume (VR)		SENS: sensitivity adjustment volume (8-turn without stopper equipped with indicator)							
	Switch (SW)		• Light-ON/Dark-ON selector switch: L.ON for Light-ON, D.ON for Dark-ON • Timer selector switch: NOR. for ON/OFF operation, ON.D for on delay (40 ms), OFF.D for of delay (40 ms)							
			• Anti Mutual Interference/turbo mode selector switch (common) 8:Anti Mutual Interference for up to 8 units, turbo function enabled 4:Anti Mutual Interference for up to 4 units, turbo function disabled				————			
	Anti Mutual Interference		Provided				————			
	Short circuit protection		Provided							
	Material		Polycarbonate							
	Connection		Permanently attached cord (outer dimension: dia. 4.8) 0.2sq. 4 core 2 m length (-J type: M8 connector *2)							
	Mass		Approx. 90 g (including 2-m cord and mounting bracket)							
	Accessory		Mounting bracket / Screwdriver for adjustment / Light shielding sticker (excluding H type) / Operation manual							

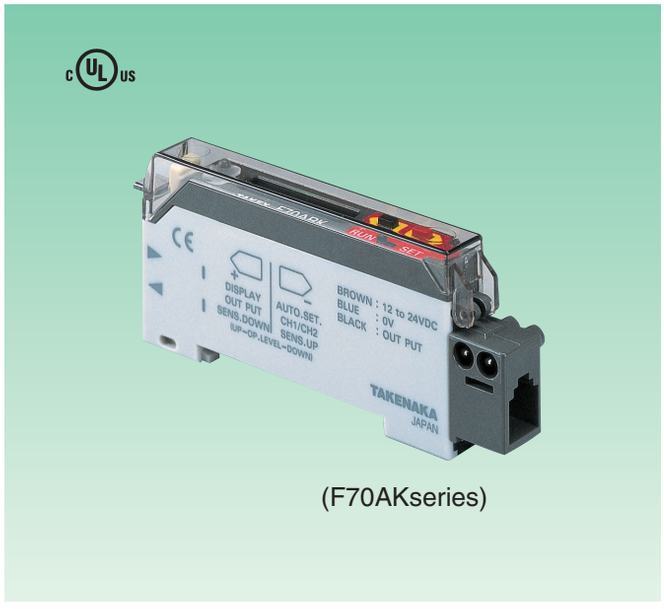
(*) Avoid the transient condition (0.5 seconds) immediately after power-up for output.
(*1) The detecting distance for high-speed response H type is reduced to roughly 30% of the ordinary type.
(*2) For details about −J (M8 connector type), see p. 23.

Environmental Specification

Environment	Ambient light	Incandescent lamp: 10,000 lx max. / Sunlight: 20,000 lx max.
	Ambient temperature	1-3 adjacent units in operation: −25 - +55 °C 4-10 adjacent units in operation: −25 - +50 °C 11-16 adjacent units in operation: −25 - +45 °C Storage: −40 - +70 °C (non-freezing)
	Ambient humidity	35-85%RH (non-condensing)
	Protective structure	IP40
	Noise	Power supply line: 500 V / Cycle: 10 ms / Pulse duration: 1 μs Radiation: 1 kV / Cycle: 10 ms / Pulse duration 1 μs (with noise simulator)
	Vibration	10-55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction
	Shock	100 m/s2 / 3 times each in 3 directions
	Dielectric withstanding	1,000 VAC for 1 minute
	Insulation resistance	500 VDC, 20 MΩ max.

Simplified Wiring K series

Simplified-wiring connection type
Fiber optic sensors



(F70AKseries)

- Digital display
- Auto sensitivity setting
- Manual sensitivity setting
- The “new” simplified-wiring connection system employed for each major amplifier model

Up to 16 units of “mixed” model combinations are allowed without a master/slave distinction

48 wires for conventional models are now reduced to 18 wires

Only one output wire required for 15 units
Model F7K-1 uses a dedicated output connector cord

Model F7K-3 power/output connector cord used for any one of the units in group

Convenient feature

Power supplied to any unit, required output taken out of any unit

Power can be supplied collectively to all units in one group (up to 16 units) at once by simply feeding power supply to any unit though the connector.
Stand-alone use is also available.
No extra power supply lines required for additional units.

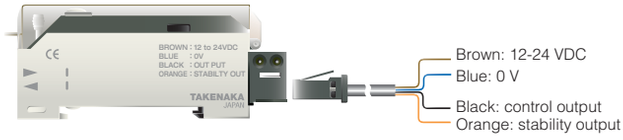
Simplified Wiring K Series

Innovative mini connector employed

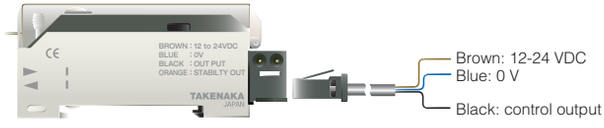
4 types of connector cords available according to input/output function required

Power/output connector cord

- With model F7K-4
  (4 leads for power supply, control output, stability output and ground)

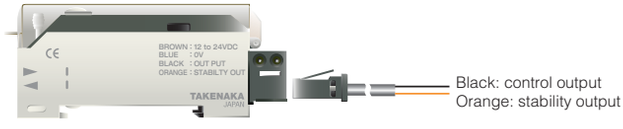


- With model F7K-3
  (3 leads for power supply, control output and ground)

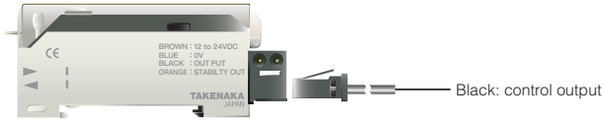


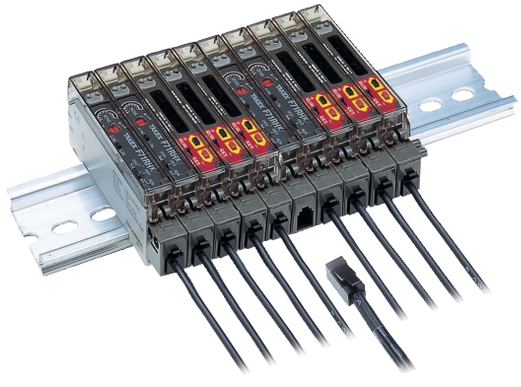
Dedicated output connector cord

- With model F7K-2
  (2 leads for control and stability outputs)



- With model F7K-1
  (1 lead for control output)

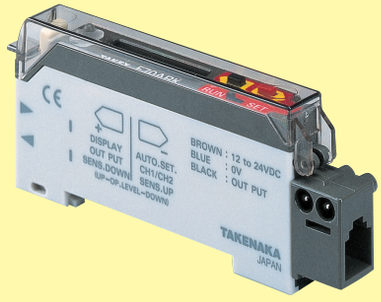




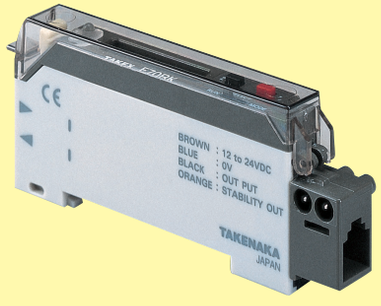
Replacement of connector cords simply by detaching and attaching connectors without moving sensors

Trio capable of serving all types of detection needs

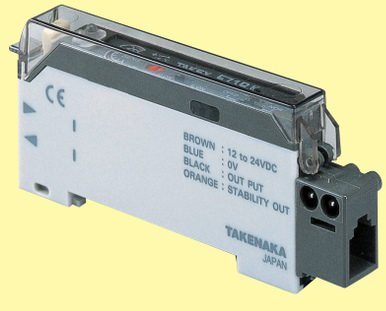
Digital display general-purpose type
F70AK series



Digital display high-performance type
F70K series



Manual sensitivity setting
General-purpose type
High-speed type
F71K series



Simplified Wiring K Series

Type

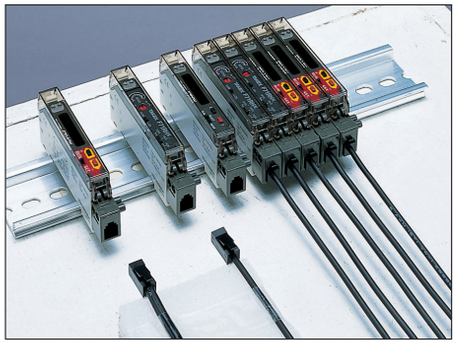
• Amplifier (main unit)

Type	Model		Light source	Output mode	Connection
	NPN output	PNP output			
Digital display general-purpose type	**F70ARK**	**F70ARKPN**	Red LED	Open collector (NPN/PNP)	Simplified-wiring connector type (specified connector cord used)
	F70AGK	**F70AGKPN**	Green LED		
	F70ABK	**F70ABKPN**	Blue LED		
	F70AWK	**F70AWKPN**	White LED		
Digital display high-performance type	**F70RK**	**F70RKPN**	Red LED		
	F70GK	**F70GKPN**	Green LED		
	F70BK	**F70BKPN**	Blue LED		
	F70WK	**F70WKPN**	White LED		
Manual setting general-purpose type	**F71RK**	**F71RKPN**	Red LED		
	F71GK	**F71GKPN**	Green LED		
	F71BK	**F71BKPN**	Blue LED		
	F71WK	**F71WKPN**	White LED		
Manual setting high-speed type	**F71RHK**	**F71RHKPN**	Red LED		
	F71GHK	**F71GHKPN**	Green LED		
	F71BHK	**F71BHKPN**	Blue LED		
	F71WHK	**F71WHKPN**	White LED		

• Specified connector cord

Type	Model	Cord length	Description
Power supply / output	**F7K-4**	2m	4 leads: power supply, 0V, control output, stability output
	F7K-3		3 leads: power supply, 0V, control output
Output only	**F7K-2**		2 leads: control output, stability output
	F7K-1		1 lead: control output

For the specification of connector cords, see p. 23.



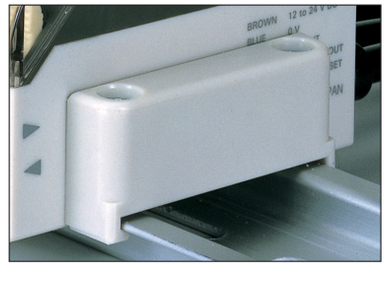
• Fiber optic cable

For different types and prices of fiber optic cables, see pp. 59-.

• Optional parts

Type	Model	Description
End unit	**FA7EU**	DIN rail mounting stopper

End unit



For Correct Use

Be sure to follow the instructions in the operation manual provided for correct use of the product.

Connection and connector cord

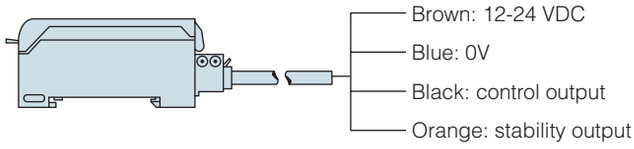
- For simplified wiring, use the specified connector cord separately available.

Type	Power/output connector cord		Dedicated output connector cord	
Model	**F7K-4**	**F7K-3**	**F7K-2**	**F7K-1**
Maximum number of attachments and detachments of connector	50			
Connector material	Polycarbonate			
Cord	Cord length: 2 m			
	Outer diameter: 4 mm (0.2sq. 4 core)	Outer diameter: 4 mm (0.2sq. 3 core)	Outer diameter: 4 mm (0.2sq. 2 core)	Outer diameter: 2.6 mm (0.2sq. 1 core)
Mass	Approx. 55 g	Approx. 50 g	Approx. 45 g	Approx. 20 g

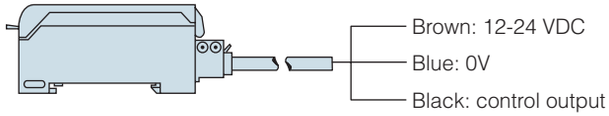
- The connector cord can be attached or detached as amplifiers are joined together without sliding them to either side.
- For the dimensions of connector cords, see p. 34.

Connection diagram

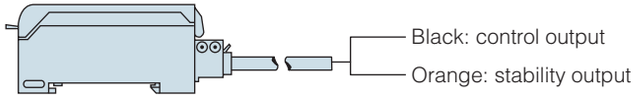
With power/output connector cord model F7K-4



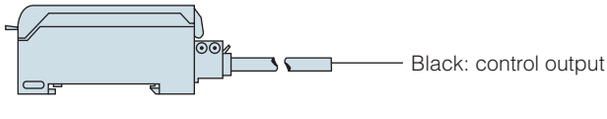
With power/output connector cord model F7K-3



Dedicated output connector cord model F7K-2

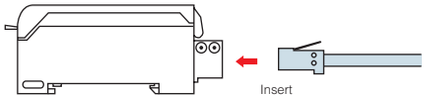


Dedicated output connector cord model F7K-1



Attachment of connector cord

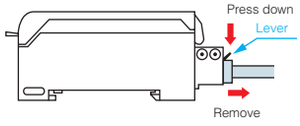
① Join fiber amplifiers.
② Insert the connector cord into each amplifier until it clicks.



③ Attach caps on the power supply terminals on the sides of the group of joined amplifiers.

Detachment of connector cord

① Cut the power supply to the fiber sensor.
② Press down the lever of the connector cord to remove the cord.

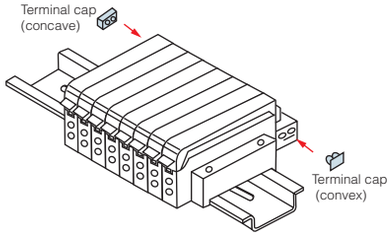


To extend the cord, use wires of at least 0.3 mm² and limit the length to within 100 m

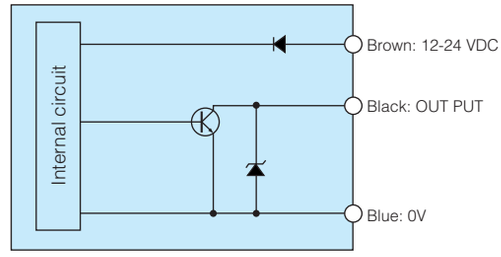
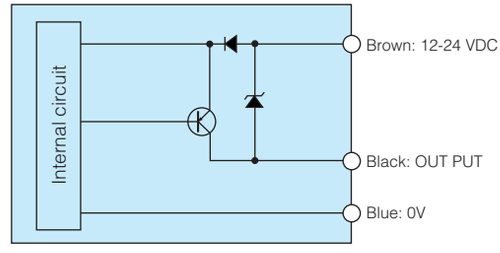
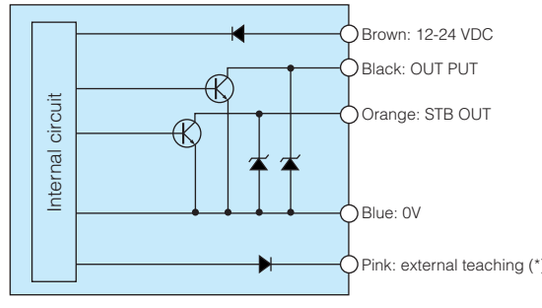
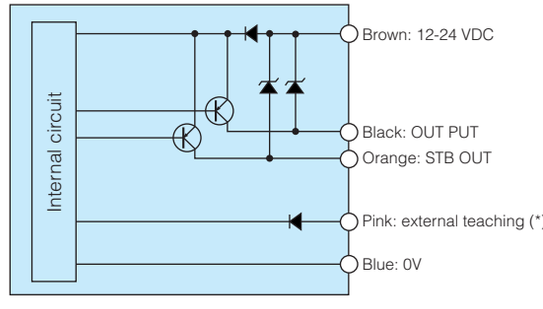
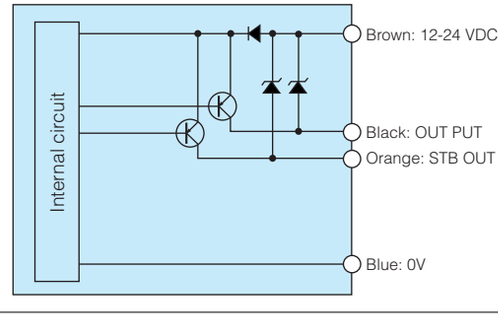
Connector pin short circuit protection

For stand-alone or joined use of amplifiers, be sure to attach the terminal caps that come with amplifiers to the terminals on the ends of a unit or group of units to prevent electrical shock or short circuit with power supply terminals on the back.

Terminal caps are in two types: convex and concave.

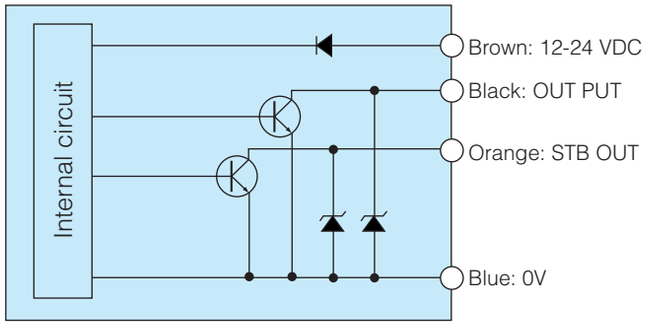
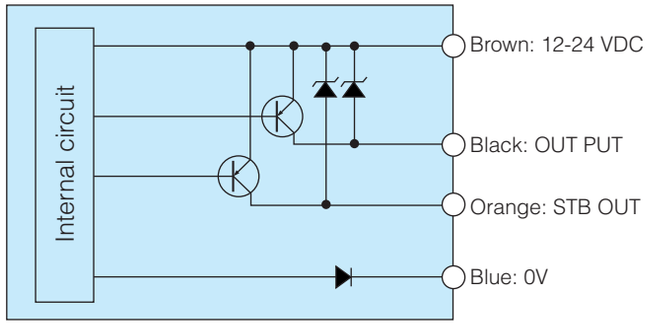


Input/Output Circuit and Connection

Model	Output circuit diagram
NPN output type **F70AR** **F70ABK** **F70AG** **F70AWK** **F70AB** **F70AW** **F70ARK** **F70AGK**	
PNP output type **F70ARPN** **F70ABKPN** **F70AGPN** **F70AWKPN** **F70ABPN** **F70AWPN** **F70ARKPN** **F70AGKPN**	
NPN output type **F70R** **F70G** **F70B** **F70W**	
PNP output type **F70RPN** **F70GPN** **F70BPN** **F70WPN**	
PNP output type **F70RKPN** **F70GKPN** **F70BKPN** **F70WKPN**	

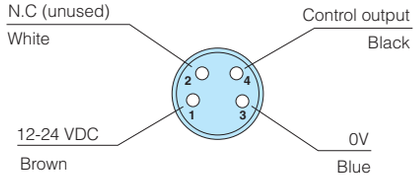
(*) When not using external teaching, cut the pink lead at the base or connect it to the positive terminal (for NPN type) or 0V (PNP type) of the power supply.

Input/Output Circuit and Connection

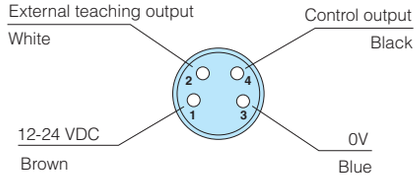
Model	Output circuit diagram
NPN output type **F70RK** **F71R** **F71RK** **F70GK** **F71G** **F71GK** **F70BK** **F71B** **F71BK** **F70WK** **F71W** **F71WK** **F71RH** **F71RHK** **F71GH** **F71GHK** **F71BH** **F71BHK** **F71WH** **F71WHK**	
PNP output type **F71RPN** **F71RKPN** **F71GPN** **F71GKPN** **F71BPN** **F71BKPN** **F71WPN** **F71WKPN** **F71RHPN** **F71RHKPN** **F71GHPN** **F71GHKPN** **F71BHPN** **F71BHKPN** **F71WHPN** **F71WHKPN**	

M8 Connector Type IO Specification/Pin Arrangement/Lead Colors

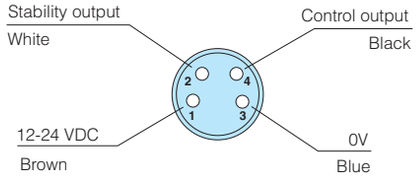
F70A" −J"



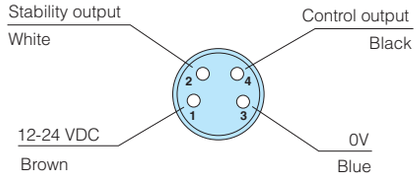
F70" −JE"



F71" −J"

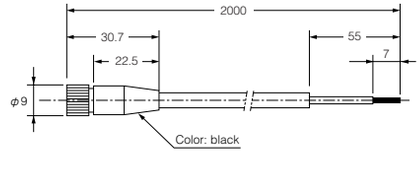


F70" −JS"

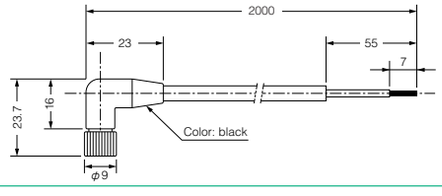


- Dimensions of cord with M8 connector (optional) (in mm)

FBC-4R2S (straight)



FBC-4R2L (angled)



Common to F70A/F70/F71 Series

For Correct Use

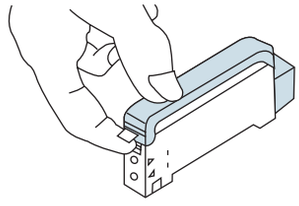
Be sure to follow the instructions in the operation manual provided for correct use of the product.

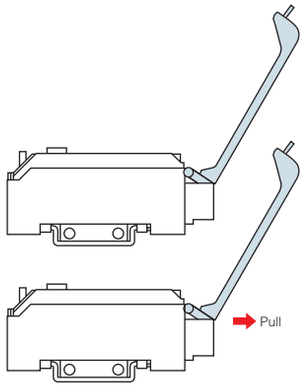
Handling of amplifier case cover

①Opening the case cover

While pressing down the front part of the case cover, lift the cover by pulling up the tab.

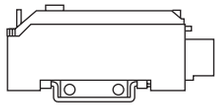
Just roughly pulling the case cover tab for opening may damage the cover. Be sure to press the front part of the cover when pulling the tab.





The cover opens up to the connector on the back and stays at the half-opened position.

Pulling at the hinge with the cover half open allows removal of the cover.

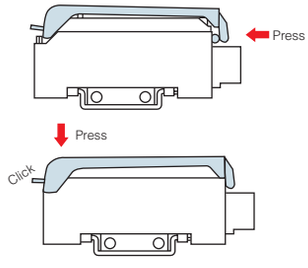


Cover removed

②Attaching the cover

Put the case cover on the amplifier as shown on the figure on the right and push in at the hinge.

Press down the front part of the cover until it clicks and make sure that the tab is hooked.

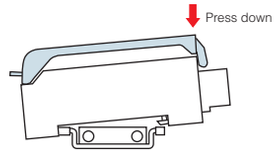


Attaching amplifier on DIN rail or mounting bracket

The mounting bracket is optional.
The amplifier cannot be side-mounted with a mounting bracket used.

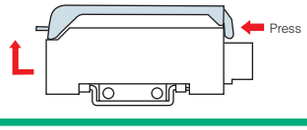
①Attachment

Put the front hook of the amplifier on the rail (or mounting bracket) and press down the back of the amplifier.



②Detachment

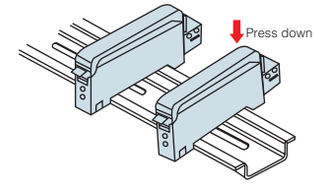
While pressing the amplifier forward, lift the front part and detach the front hook.



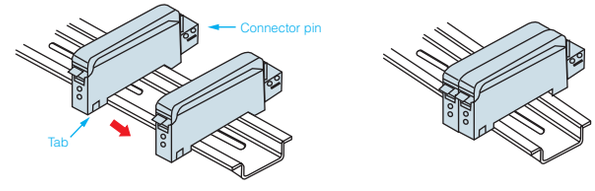
Attachment of amplifiers for joined use

When using two or more amplifiers by joining them together, be sure to use a DIN rail for mounting.
Up to 16 units can be joined for use.
Be sure to cut the power supply before attempting to join or separate units.

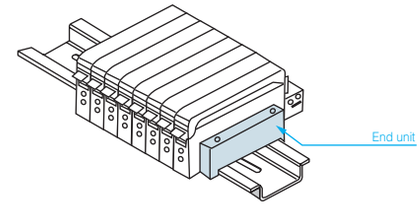
①Mount one amplifier at a time on the DIN rail while keeping a certain space between amplifiers.



②Slide the amplifiers so that the tabs on the front and the connector pins on the back are respectively joined together.



③To prevent the connections from coming loose due to vibration, etc., attach end units (optional) on the ends of the group of amplifiers to secure them.



④To detach the amplifiers, follow the steps in reverse order and remove one amplifier at a time.

Removing the amplifiers as they are joined together without sliding may damage the amplifiers.

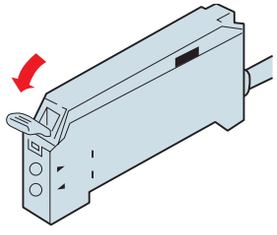
For Correct Use

Be sure to follow the instructions in the operation manual provided for correct use of the product.

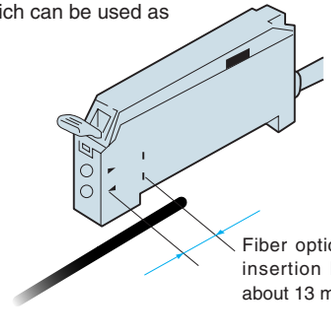
Attachment of fiber optic cable

Attachment to amplifier

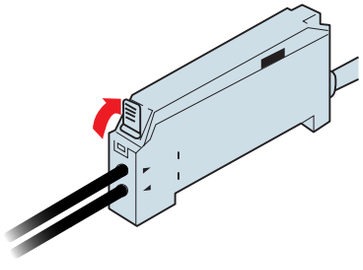
1. Open the case cover and press down the single-touch lock lever.



2. Insert the fiber optic cable all the way until it stops.
   To prevent inadequate insertion of a fiber optic cable, marks to indicate the insertion length are provided on the case side, which can be used as gauges.

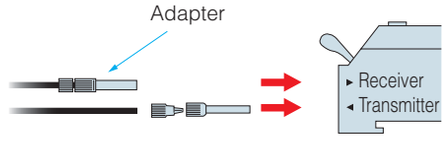


3. Lift the single-touch lock lever.



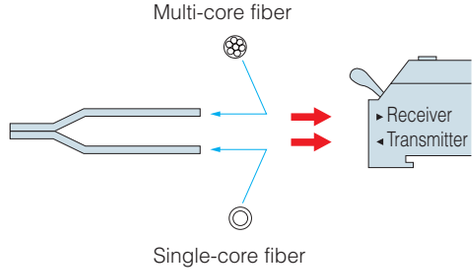
Attachment of small-diameter fiber optic cable

When attaching a small-diameter fiber optic cable, use the adapter that comes with the fiber optic cable.



Attachment of coaxial reflective fiber optic cable

Attach the multi-core fiber to the receiver and single-core fiber to the transmitter.



Notes on usage

- When using two or more amplifiers joined together, be sure to use a DIN rail for mounting.
  Different ambient temperatures apply according to the number of joined amplifiers.

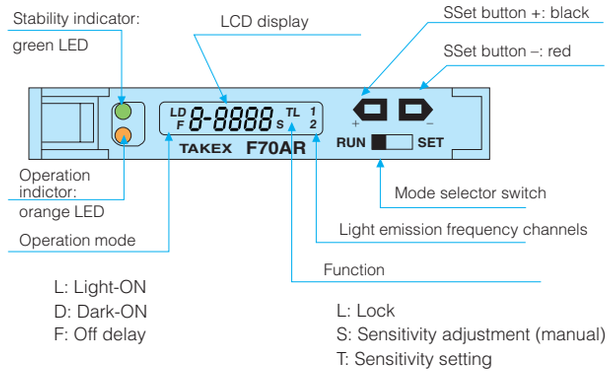
No. of amplifiers	Ambient temperature
1-3	−25 - +55 ºC
4-10	−25 - +50 ºC
11-16	−25 - +45 ºC

- Be sure to turn off the power supply before wiring.
- To extend the cord, use wires of at least 0.3 mm² and limit the length to within 100 m.
- Using the same conduit for the amplifier wiring and power transmission or high-voltage lines may cause faulty operation or damage due to noise. Be sure to route them separately.
- Make sure that the power fluctuation is within an allowable range so that the power input will not exceed the rating.
- When using a commercially-available switching regulator, use the frame ground or ground terminal.
- For output, avoid the transient condition (0.5 seconds) immediately after power-up.
- Do not use the sensor in a place subject to steam, large amount of dust or direct exposure to water or oil.
- Do not use the sensor outdoors or in a place subject to direct disturbing light on the light receiving surface.
- Use of a reflective-type fiber optic cable at the maximum sensitivity may cause inadequate light blocking. Be sure to use a work for sensitivity setting.

For Correct Use

Be sure to follow the instructions in the operation manual provided for correct use of the product.

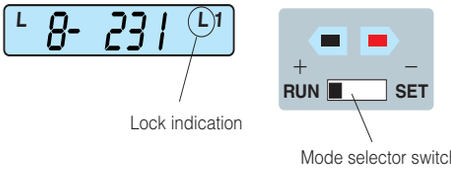
Part names

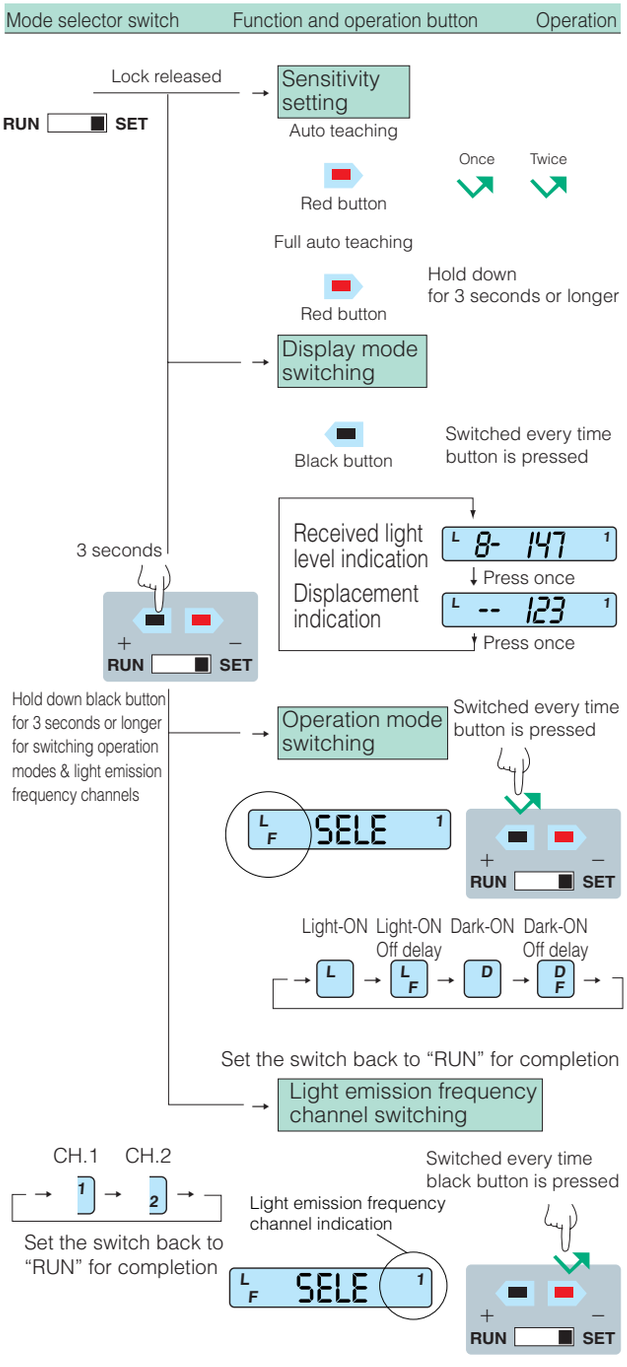


Operation

Mode selector switch

This switch should be set to RUN for normal object detection, which enables the lock mode and disables all operations on the sensor.
Setting the mode selector switch to SET releases the lock, which allows operations on the sensor.





For Correct Use

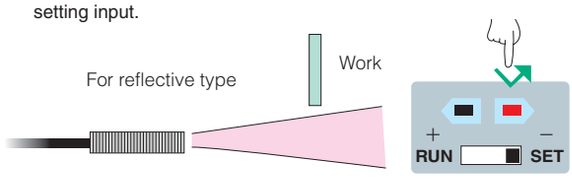
Be sure to follow the instructions in the operation manual provided for correct use of the product.

Sensitivity setting (teaching)

Set the operation mode selector switch from RUN to SET.
The lock is released and the sensor enters the sensitivity setting ready state.

Sensitivity setting using stationary work — auto teaching

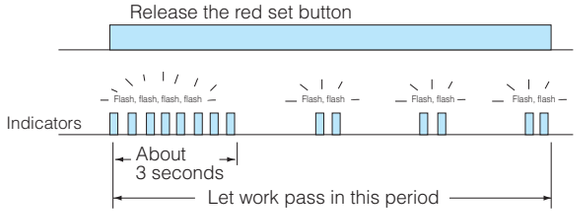
1. With no work placed, press the red set button and release it. The indicator flashes, showing that the sensor is ready for the next setting input.



2. Place the work in a given position and press the red set button. The indicator stops flashing, showing that sensitivity setting is complete.

Sensitivity setting using moving work — full auto teaching

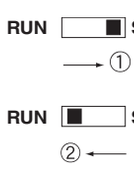
1. Press and hold down the red set button. The orange and green indicators start flashing alternately and the flashing becomes slower after about 3 seconds.
2. Let the work pass while holding down the red set button.
3. When the passing of the work and the slow flashing of the indicators have been confirmed, release the set button.



Interference between sensors prevents correct sensitivity setting. For correct sensitivity setting, make sure that there is no interference of light by blocking the light from either of the sensors or removing the fiber optic cable from either of the amplifiers.

Manual adjustment of activation level

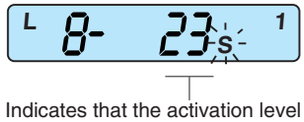
Sensor operation can be monitored while adjusting the activation level, which allows setting of the optimum operation level.



After setting the switch from RUN to SET (1), set it back to RUN (2).

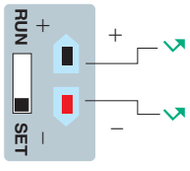
The lock is released and the sensor enters the sensitivity adjustment mode.

For received light indication mode



Indicates that the activation level is “23.”

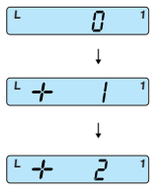
“S” flashes to indicate that the sensitivity can be adjusted.



Activation level raised every time button is pressed = SENS DOWN

Activation level lowered every time button is pressed = SENS UP

For displacement indication mode



Before adjustment, activation level of “0” is shown.

The number is increased (decreased) every time the black (red) set button is pressed.

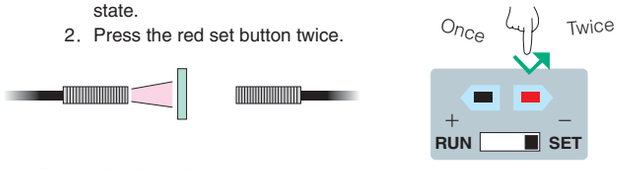
Sensitivity adjustment completed

The mode automatically switches back to the lock mode about 10 seconds after the sensitivity adjustment has been completed.

Maximum sensitivity setting: Press the red set button twice with the light blocked.

For through-beam type

1. Block the light beam with a work, etc. to make the light blocking state.
2. Press the red set button twice.

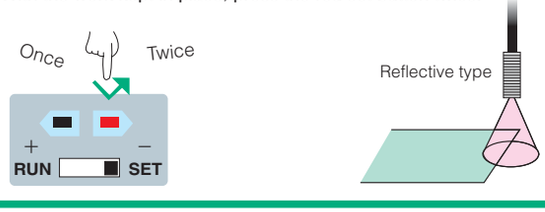


For reflective type

Use of a reflective-type fiber optic cable at the maximum sensitivity may cause inadequate light blocking. Be sure to use a work for sensitivity setting.

Work positioning setting

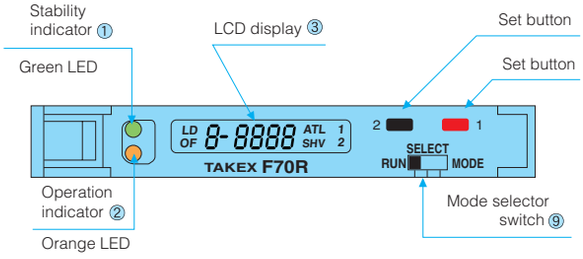
1. Place the work at the desired position.
2. With the work kept in place, press the red set button twice.



For Correct Use

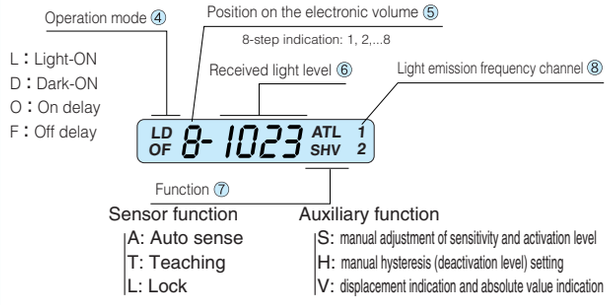
Be sure to follow the instructions in the operation manual provided for correct use of the product.

Part names



③……LCD display

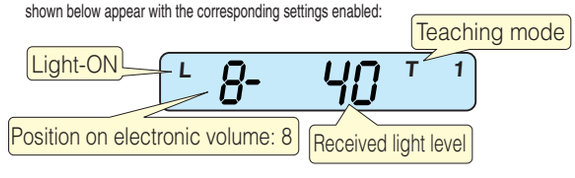
Shows the status and functions of the sensor including operation mode and received light level.



①……Stability indicator
②……Operation indicator
③……LCD display
④……Operation mode
⑤……Position on electronic volume
⑥……Received light level
⑦……Function
⑧……Light emission frequency channel
⑨……Mode selector switch

Initial (factory) setting

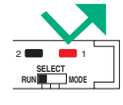
When a fiber optic sensor has been mounted and power supplied for the first time, indications as shown below appear with the corresponding settings enabled:



Simple setting for immediate use

(For reflective type)

1) Press Button 1 once with no work present. The orange and green indicators flash.
2) With the work in place, press Button 1 once again.



(For through-beam type)

1) Block the light beam with the work, etc. to set the light blocking state.
2) Press Button 1 twice. The setting is complete.

Note

Use of a reflective-type fiber optic cable at the maximum sensitivity may cause inadequate light blocking. Be sure work is present for auto or full auto teaching.

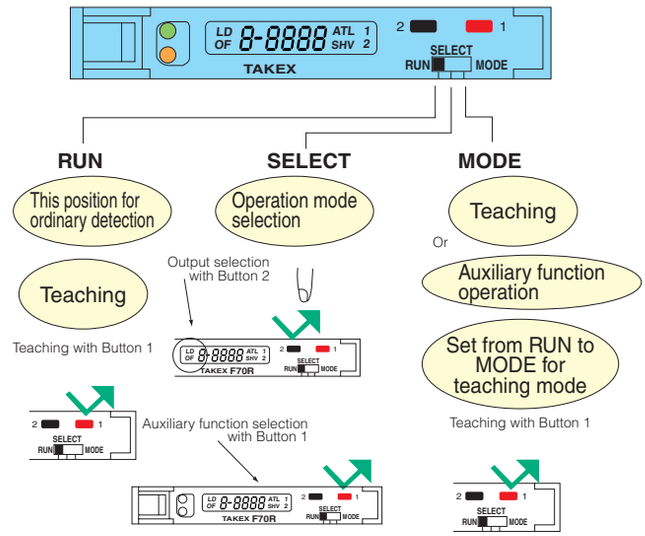
Operation

Mode selector switch

Sensor function
Functions as an ordinary sensor.

Select function
- ✻Selection of Light-ON/Dark-On and timer operation.
- ✻Selection of sensor function.
- ✻Selection of auxiliary function.

Mode function
- ✻Sensitivity setting (teaching) in the lock mode
- ✻Activates the auxiliary function selected in [SELECT]

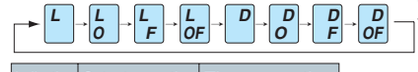


Operation mode setting

Select between Light-ON and Dark-ON and timer operations.

1) Set the switch from RUN to SELECT.

2) Press Button 2. The indication rotates in the order shown below by one step every time the button is pressed.



Indication	Output operation	Timer operation
L	Light-ON	None
L O	Light-ON	On delay
L F	Light-ON	On delay
L O F	Light-ON	On/Off delay
D	Dark-ON	None
D O	Dark-ON	On delay
D F	Dark-ON	Off delay
D O F	Dark-ON	On/Off delay

3) Select a desired mode and set the switch back to RUN, which enables the selected operation mode.

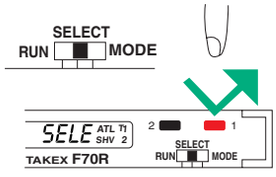
For Correct Use

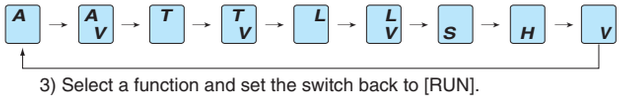
Be sure to follow the instructions in the operation manual provided for correct use of the product.

Sensor function/auxiliary function setting

Sensor function selection

1) Set the switch to SELECT.
2) Press Button 1
   The indication rotates in the order below by one step every time the button is pressed, allowing the selection of a "sensor function" and "auxiliary function".

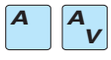




3) Select a function and set the switch back to [RUN].
   The function selection is stored in the memory.

Sensor function

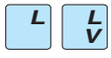
A: Auto sense mode — Constantly monitors the level of received light and, if any variation is found, the on/off level is automatically adjusted.



・The adjusted on/off level is not stored in the memory. The initial data is applied when the power supply is cut off once and supplied again.

T: Teaching mode — Allows sensitivity setting.The setting method options include "auto teaching," "full auto teaching" and "external signal."

L: Lock mode — Prohibits sensitivity setting.



AV, TV, LV — Displacement indication mode — The level of received light with the work used is indicated in positive or negative value (displacement) with reference to the level of received light at the time of teaching.

Auxiliary function selection

Auxiliary function

S: Allows adjustment of the "sensitivity" and "activation level" already set.

H: Allows adjustment of the hysteresis (deactivation level).

V: Indicates the absolute value.

- Select one of these functions and set the switch to [MODE], which enables the auxiliary function selected.

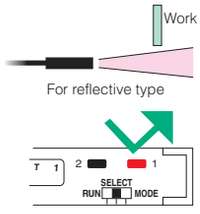
LCD display

- The received light level displayed on the LCD shows an average value for a certain period of time and may contain an error of +/− 1-2.
- When the Anti Interference feature is enabled, the received light level indication on the LCD may show an incorrect value. For correct indication, eliminate the interference by blocking the light causing the interference or cutting of the power supply to the sensor causing the interference and read the value.

Sensitivity setting (teaching)

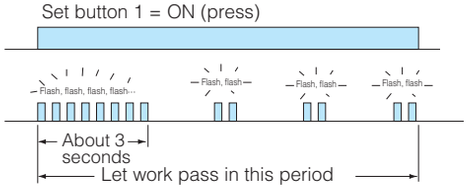
Auto teaching (with stationary work)

1) Press Button 1 with no work placed and release the button. The indicator flashes, showing that the sensor is ready for the next teaching input.
2) With the work in place, press Button 1 once and release it. The indicator stops flashing, showing that sensitivity setting is complete.



Full auto teaching (with moving work)

1) Press and hold down Button 1 for 3 seconds or longer.
   The orange and green indicators start flashing alternately and the flashing becomes slower a little later.
2) Let the work pass while holding down Button 1.
3) When the passing of work and the slow flashing of indicators have been confirmed, release Button 1.



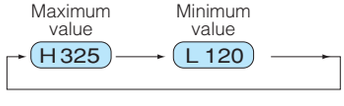
Positioning teaching

1) Place the work at the desired position.
2) Press Button 1 twice, which completes the positioning.

Teach hold function

Holds momentary data during full auto teaching.

Releasing Button 1 shows the maximum and minimum data during teaching (the maximum and minimum values are alternately shown for about 3 seconds).

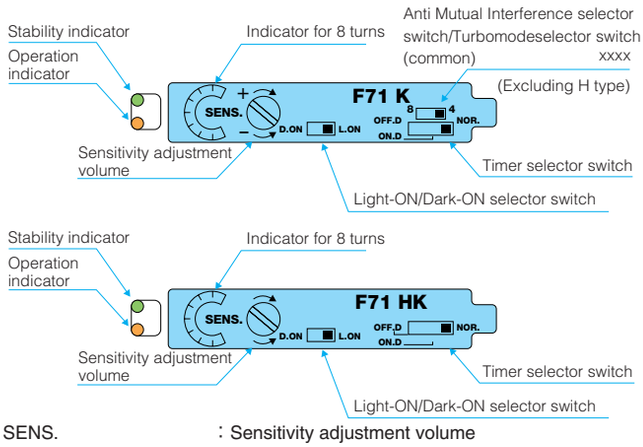


This hold function is not available with the external teaching function.

For Correct Use

Be sure to follow the instructions in the operation manual provided for correct use of the product.

Part names



SENS.	: Sensitivity adjustment volume
L.ON／D.ON	: Light-ON (ON when light is received)/Dark-ON (ON when light is blocked) mode selector switch
4／8 (excluding H type)	: Anti Mutual Interference selector switch (4: 4 units/8: 8 units) Turbo mode selector switch (4: turbo off/8: turbo on)
NOR／ON.D／OFF.D	: Timer selector switch (Disabled/On delay/Off delay)

Operation indicator

The orange LED is illuminated when the signal is activated.

Stability indicator

The green LED is illuminated when the received light level is well above (120% of) the activation level. As long as the stability indicator is illuminated when the light is received, the stability of the detection is ensured without being affected by variation of environment such as ambient temperature.

Anti Mutual Interference/turbo function (excluding H type)

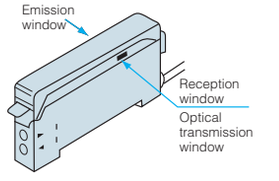
The Anti Mutual Interference selector switch doubles with turbo function selector switch.

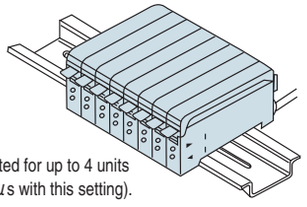
Switch set to 8 : The Anti Mutual Interference feature is available for up to 8 units and the turbo function is enabled.

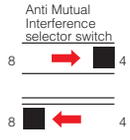
Switch set to 4: The Anti Mutual Interference feature is available for up to 4 units and the turbo function is disabled. The response time is 250 μs.

Anti Mutual Interference

This product is equipped with the Anti Mutual Interference feature that takes advantage of optical transmission. The optical transmission system uses the transmission windows including emission and reception windows in the sides of an amplifier unit as a light path. For this reason, amplifiers must be mounted adjacently on a DIN rail so that the transmission windows of adjoining units are aligned for secure functioning of the Anti Mutual Interference feature.







Interference may be prevented for up to 4 units (the response time is 250 μs with this setting).

Interference may be prevented for up to 8 units (the response time is 500 μs with this setting).

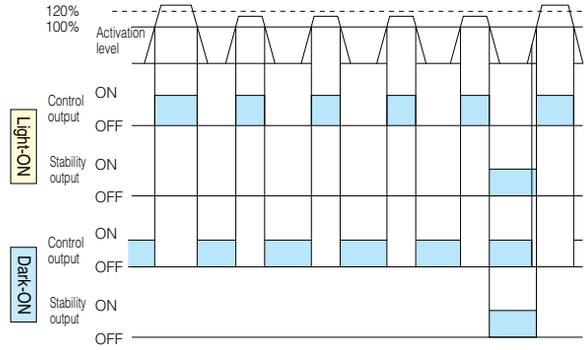
Turbo function

Setting the turbo mode selector switch to “8” enables the turbo function. With this function enabled, the response time is increased to 500 μs but the detecting distance is also increased by about 30% compared with that for the turbo function disabled (set to “4”).

Stability output

The stability output can be used to check for reduction of the light intensity level along with any change in the operating environment or operation over time or to perform initial check of the operation.

When four consecutive detections have occurred with the level of received light exceeding the operation level but not reaching 120 percent of the level (range not allowing stable operation), the stability signal is output when the control output is deactivated for Light-ON mode. The stability indicator starts flashing at the same time as the activation of the stability output. If the level of received light gains a margin, the stability output is deactivated and the stability indicator stops flashing and becomes illuminated (normal illumination).



Sensitivity adjustment

Reflective type (adjustment for Light-ON mode)

①Place the object to be detected in a given position, turn up the sensitivity adjustment volume (SENS) gradually from Min. and find the point at which the operation indicator (orange LED) is illuminated (Point A).

②Remove the object, turn down the sensitivity adjustment volume gradually from Max. and find the point at which the operation indicator (orange LED) goes out (Point B). (If the operation indicator is not illuminated even at Max., Max. is regarded as Point B.)

③Set the volume at midway between Points A and B.

④With the object placed in a given position (light reception state), make sure that the stability indicator (green LED) is illuminated.

Through-beam type (adjustment for Light-ON mode)

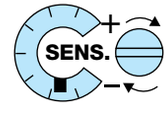
①With the object to be detected removed, turn up the sensitivity adjustment volume (SENS) to Max. and make sure that the operation indicator (orange LED) and stability indicator (green LED) are illuminated. (If the stability indicator is not illuminated, the set distance may be too long or the light axis may not be aligned.)

②Turn down the sensitivity adjustment volume gradually from Max. and find the point at which the operation indicator (orange LED) goes out (Point A).

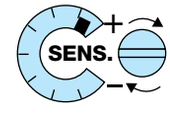
③With the object placed in a given position, turn up the sensitivity adjustment volume gradually and find the point at which the operation indicator (orange LED) is illuminated (Point B). (If the operation indicator is not illuminated even at Max., Max. is regarded as Point B.)

④Set the volume at midway between Points A and B.

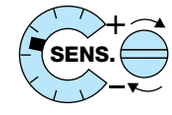
⑤With the object removed (light reception state), make sure that the stability indicator (green LED) is illuminated.



Point A = 1.5



Point B = 7.5



Optimum position = 4.5

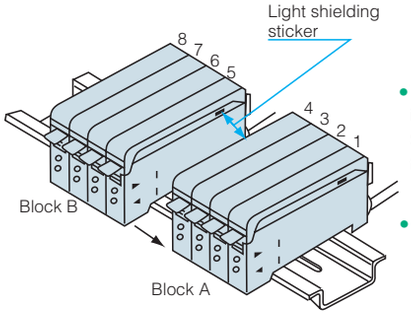
For Correct Use

Be sure to follow the instructions in the operation manual provided for correct use of the product.

Use the light shielding sticker (accessory) for grouping amplifiers into blocks when taking advantage of the Anti Mutual Interference features to use more than one sensor. The sticker can also be used when the transmission windows may be subject to strong ambient light. (If the detection allows no mutual interference, there is no need to use the sticker even if the amplifiers are mounted adjacently.)

Example 1

8 sensors used (4 units of Block A and 4 units of Block B)

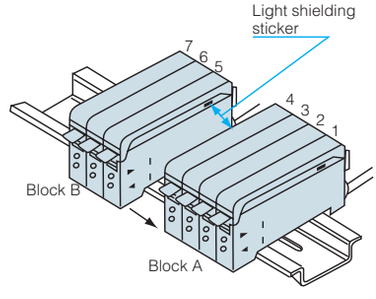


- The 4 units in Block A do not interfere with each other Selector switch = 4 (response time = 250 μs)
- The 4 units in Block B do not interfere with each other Selector switch = 4 (response time = 250μs)

- Apply one light shielding sticker to each of the open transmission windows in the fourth and fifth units.
- After the stickers have been applied, slide one block of units until they come in contact with the other block.
- Note: There may be interference between the two blocks of sensors.

Example 2

7 sensors used (4 units of Block A and 3 units of Block B)

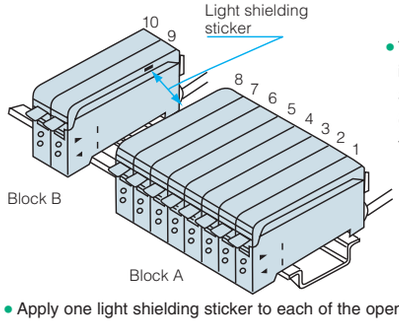


- The 4 units in Block A do not interfere with each other Selector switch = 4 (response time = 250 μs)
- The 3 units in Block B do not interfere with each other Selector switch = 8 (response time = 500 μs, turbo function enabled)

- Apply one light shielding sticker to each of the open transmission windows in the fourth and fifth units.
- After the stickers have been applied, slide one block of units until they come in contact with the other block.
- Note: There may be interference between the two blocks of sensors.

Example 3

10 sensors used (8 units of Block A and 2 units of Block B)



- The 8 units in Block A do not interfere with each other Selector switch = 8 (response time = 500 μs, turbo function enabled)
- The 2 units in Block B do not interfere with each other Selector switch = 8 (response time = 500 μs, turbo function enabled)

- Apply one light shielding sticker to each of the open transmission windows in the eighth and ninth units.
- After the stickers have been applied, slide one block of units until they come in contact with the other block.
- Note: There may be interference between the two blocks of sensors.

If the selector switch setting is mixed (both “4” and “8” settings are present) within one block, the Anti Mutual Interference feature does not work. Make sure that the selector switch settings are consistent (either “4” or “8”) within one block.

Detecting distance for -H type

For high-speed response models, the detecting distance is generally about 30% of normal models.

Typical example

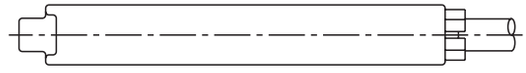
Detection method	Detection method	Detecting distance
Reflective	FR5BC	35mm
Through-beam	FT5BC	95mm

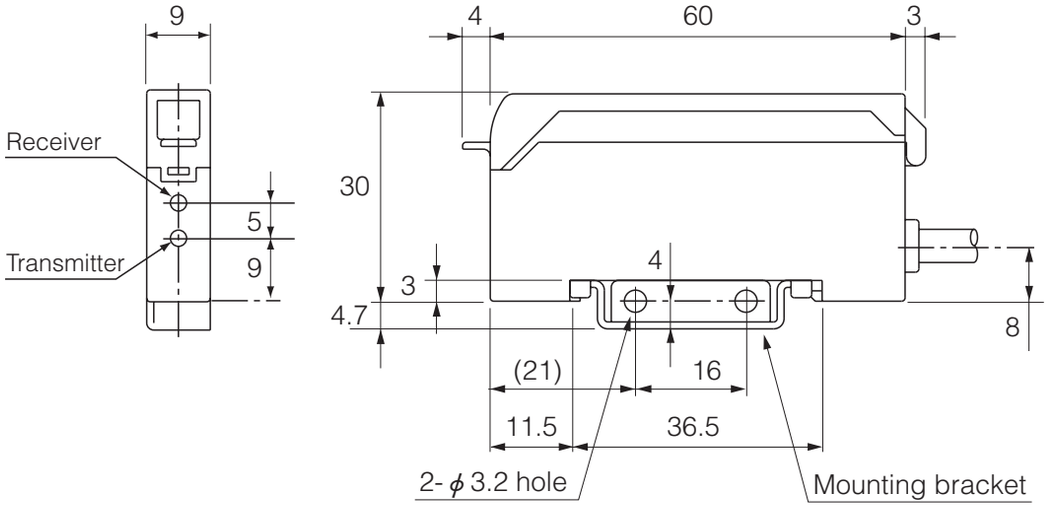
(With turbo function disabled)

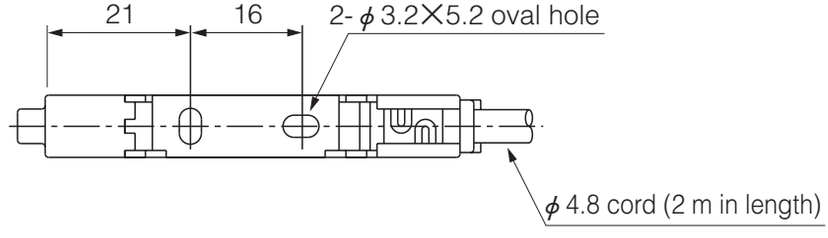
Cord-Connected Type

Dimensions (in mm)

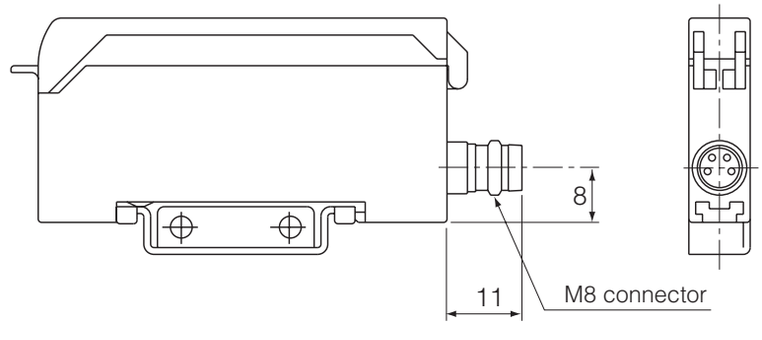
Amplifier
F70A/F70 Series
F 71 Series
(Common)







M8 connector type



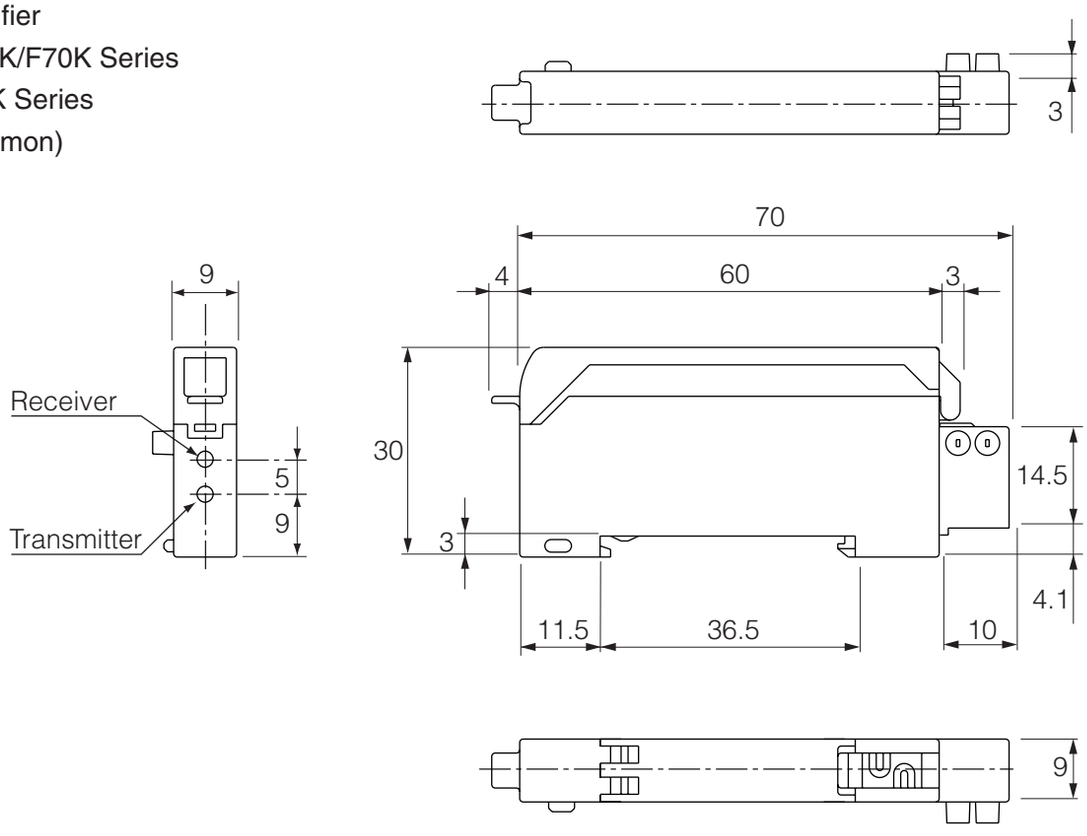
(For dimensions of connector cords, see p. 23.)

For dimensions of fiber optic cables, see pp. 67-.

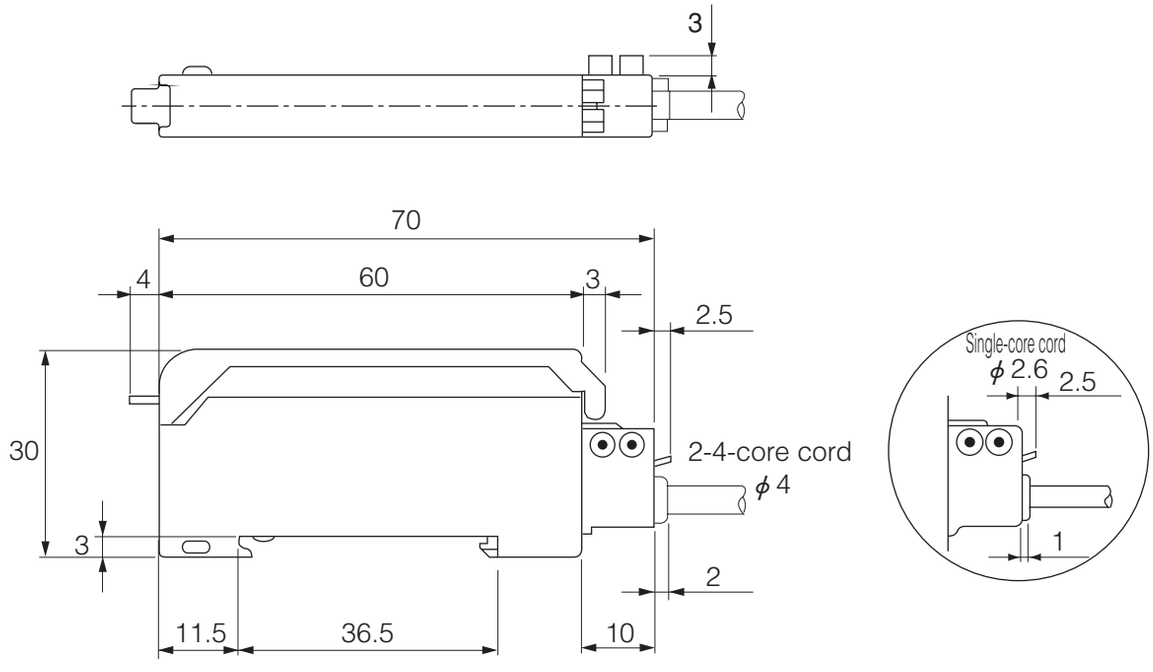
Simplified-Wiring Connective Type

Dimensions (in mm)

Amplifier
F70AK/F70K Series
F 71K Series
(Common)



With specified connector cord attached

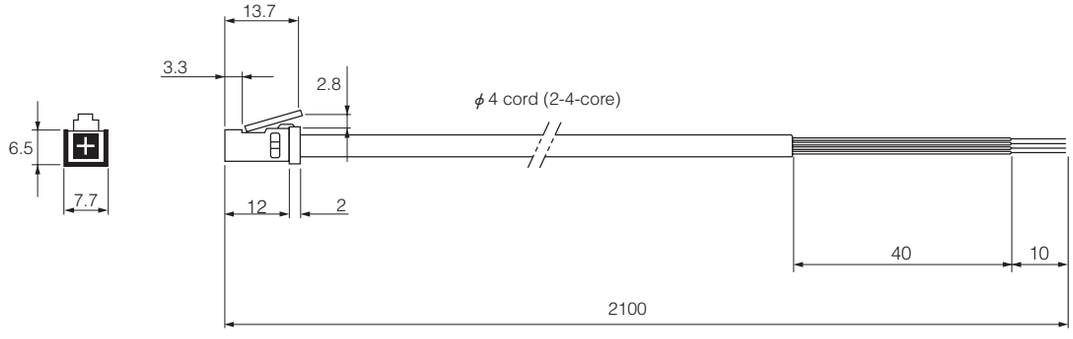


For dimensions of fiber optic cables, see pp. 67-.

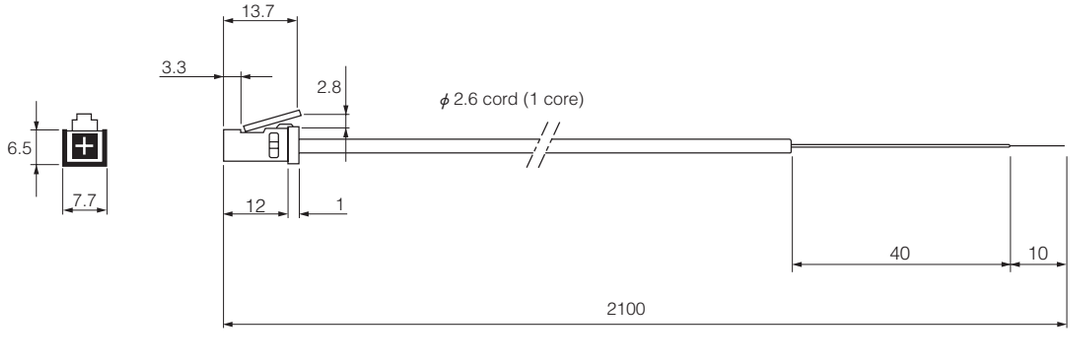
Simplified-Wiring Connective Type

Dimensions (in mm)

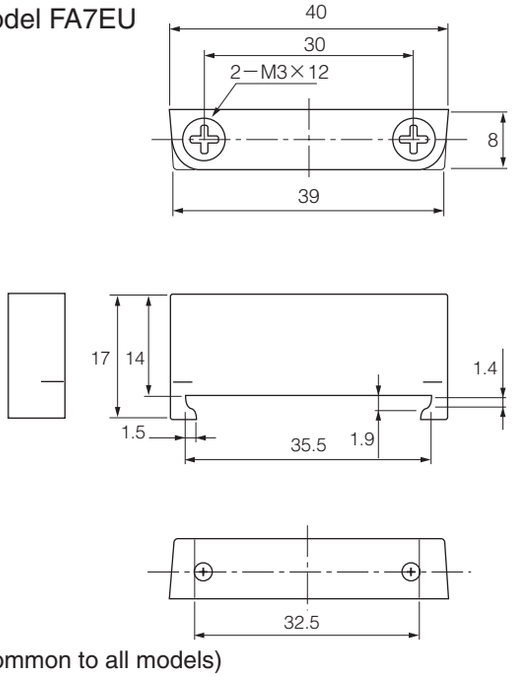
Specified connector cord
Model F7K-2
Model F7K-3
Model F7K-4



Model F7K-1

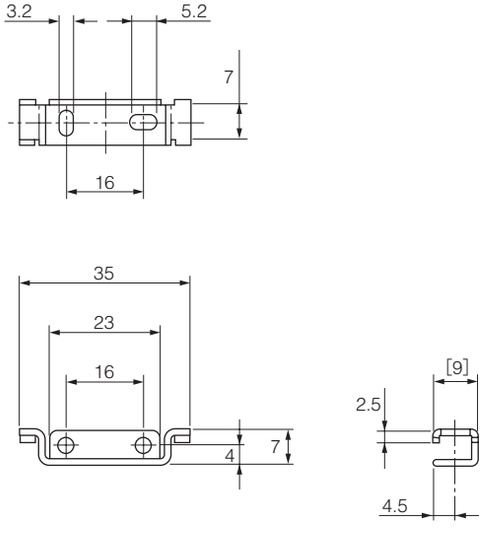


End unit (optional)
Model FA7EU



(Common to all models)

Mounting bracket (optional)
Model AC-BF2



(Provided as accessory for models other than simplified-wiring connective type)

F70T Series

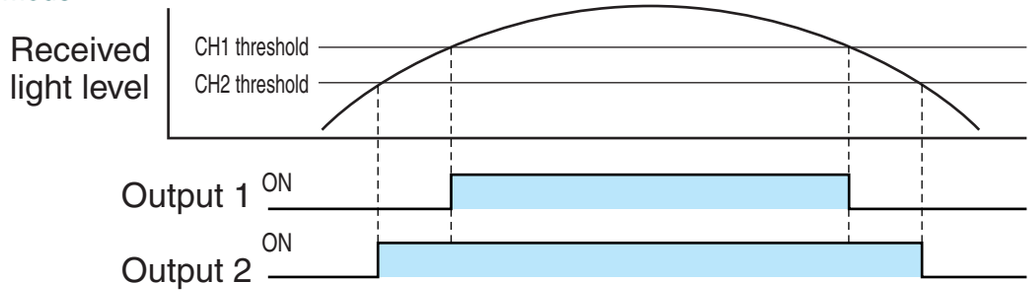
- 2-point “area” output modes are available
- Inherits advanced functions of the F70 Series and now allows a wider range of detecting conditions

Type

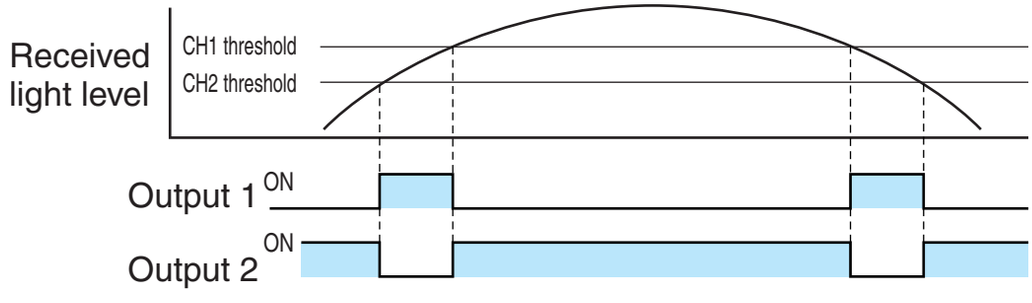
Detection method/ detecting distance	Model		Operation mode	Output mode	Light source
	NPN output	PNP output			
Dependant on fiber optic cable, light source, etc.	**F70TR**	**F70TRPN**	Light-ON/ Dark-ON selectable	2-point output/area output selectable, open collector	Red LED
	F70TG	**F70TGPN**			Green LED
	F70TB	**F70TBPN**			Blue LED
	F70TW	**F70TWPN**			White LED

Output mode selectable

2-point output mode



Area output (window comparator output) mode



Rating/Performance/Specification

Rating/performance	Model	NPN type	**F70TR**	**F70TG**	**F70TB**	**F70TW**
		PNP type	**F70TRPN**	**F70TGPN**	**F70TBPN**	**F70TWPN**
	Detection method		Through-beam type, reflective type (Dependant on fiber optic cable)			
	Detecting distance		Dependant on fiber optic cable, light source, etc.			
	Power supply		12~24V DC ±10% / Ripple 10% max.			
	Current consumption	NPN type	39 mA max.			
		PNP type	50 mA max.			
	Output mode	Control output	2-point output/area output (window comparator output) selectable			
			2 open collector outputs			
		Rating NPN type	Ch 1: sink current 100 mA (30 VDC max.) / Residual voltage: 1 V or less			
			Ch 2: sink current 50 mA (30 VDC max.) / Residual voltage: 1 V or less			
		Rating PNP type	Ch 1: source current 100 mA (30 VDC max.) / Residual voltage: 2 V or less			
			Ch 2: source current 50 mA (30 VDC max.) / Residual voltage: 2 V or less			
	Operation mode		Light-ON/Dark-ON selectable			
		Timer	On delay/off delay/on-off delay/disabled selectable			
			Delay time: 40 ms fixed			
	Response time		1 ms max.			
	Accessory		Mounting bracket / Operation manual			
Specification	Light source (wavelength)		Red LED (660nm)	Green LED (525nm)	Blue LED (470nm)	White LED
	Indicator		Operation indicator: CH1 = Green LED / CH2 = Orange LED			
	Display		LCD display with backlight			
	Switch		2 set buttons / Mode selector switch: RUN/SELECT/TEACH			
	Teaching method		Full auto teaching / Auto teaching			
	Teaching input		Set button			
	Short circuit protection		Provided			
	Material		Polycarbonate			
	Connection		Permanently attached cord (outer dimension: dia. 4.8) 0.2sq. 4 core 2 m length			
	Mass		Approx. 80 g (including mounting bracket)			

Environmental Specification

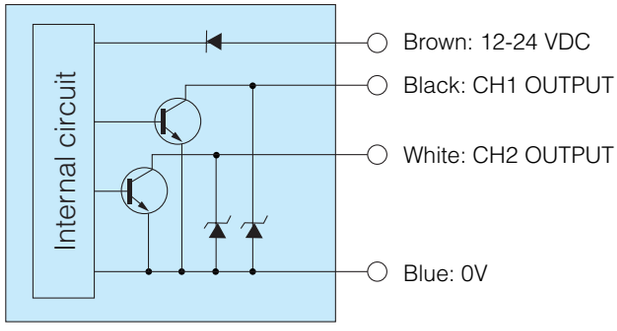
Environment	Ambient light	Incandescent lamp: 10,000 lx max. / Sunlight: 20,000 lx max.
	Ambient temperature	-25 ~ +55ºC Storage: -40 ~ +70 ºC (non-freezing)
	Ambient humidity	35~85%RH (non-condensing)
	Vibration	10~55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction
	Shock	500 m/s² / 3 times each in 3 directions

For different types and specifications of fiber optic cables, see pp. 59-.

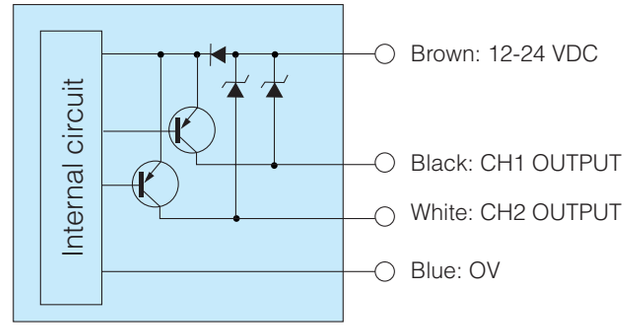
F70T

Input/Output Circuit and Connection

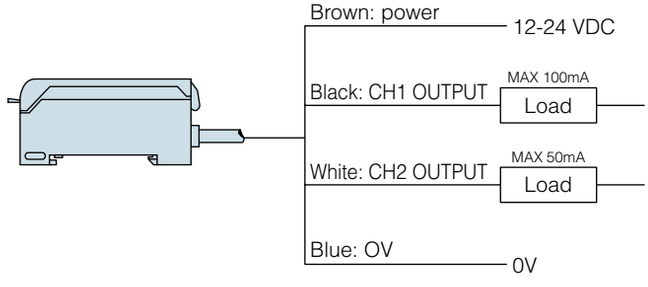
- NPN output



- PNP output



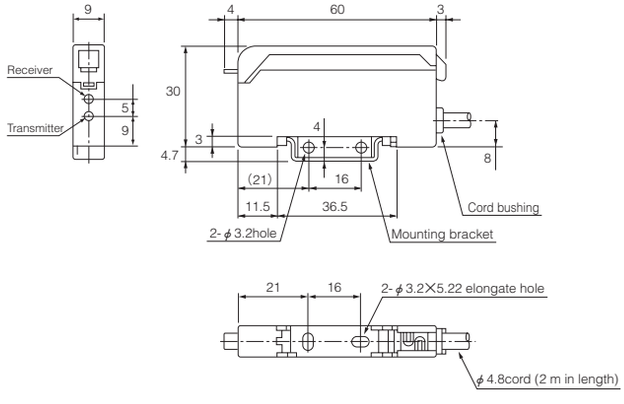
- Connection



- To extend the cord, use wires of at least 0.3 mm² and limit the length to within 100 m.

Dimensions (in mm)

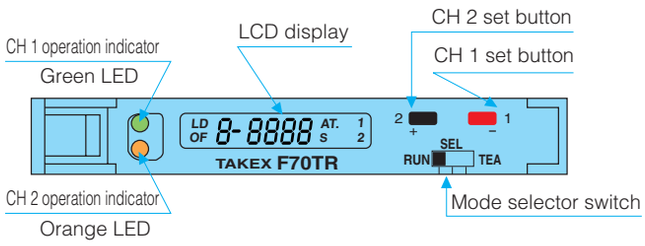
CAD



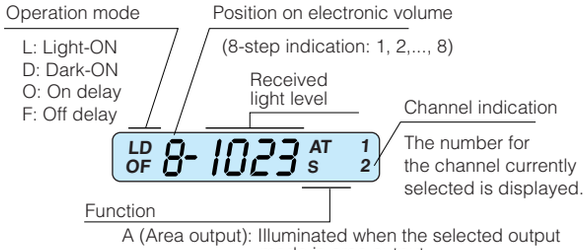
For Correct Use

Be sure to follow the instructions in the operation manual provided for correct use of the product.

Part names

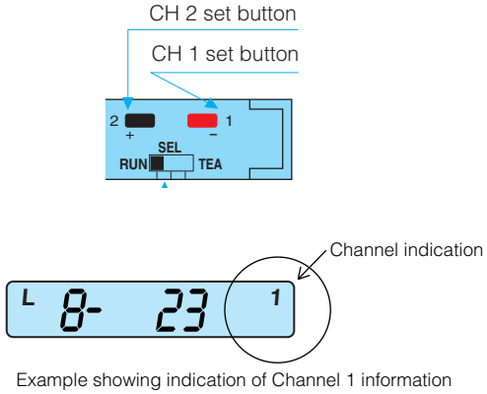


LCD display



Channel indication

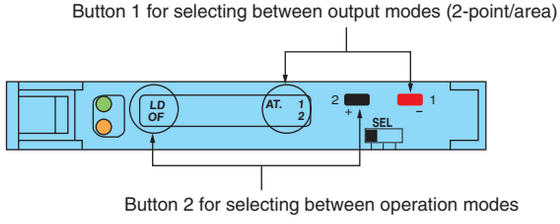
The "display" switches between indications for Channels 1 and 2.
The LCD channel display indicates the active channel.
To switch between channels, with the selector switch at the RUN position, press the set button for the channel to display.



Example showing indication of Channel 1 information

Operation

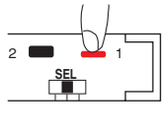
Selecting operation and output modes



Output mode selection: selecting between 2-point/area output modes

1. Set the operation selector switch to SEL.

2. Press and hold down Button 1 for 3 seconds or longer then release the button.



3. Pressing Button 1 once (for about 1 second) alternates between flashing indications for 1/2 and A.

1/2 or A flashes

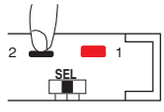
Selection: { For 2-point output, select the flashing indication for 1/2. / For area output, select the flashing indication for A.

4. Set the output selector switch back to RUN.

Operation mode selection: selecting between Light-ON/Dark-ON and timer functions

1. Set the operation selector switch to SEL.

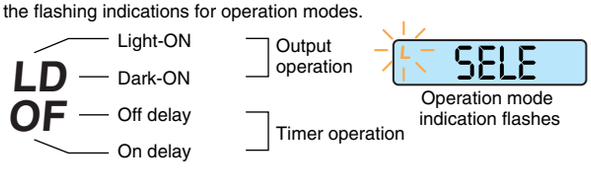
2. Press and hold down Button 2 for 3 seconds or longer and release the button.



3. Use Button 1 to select the channel to set.

Channel No.

4. Pressing Button 2 once (for about 1 second) switches between the flashing indications for operation modes.



5. Select the operation mode as required and set the operation selector switch back to RUN to complete.

For Correct Use

Be sure to follow the instructions in the provided operation manual for correct use of the product.

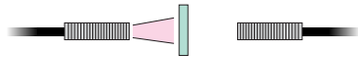
Sensitivity setting for 2-point output

Maximum sensitivity setting: Press the set button twice with the light blocked.

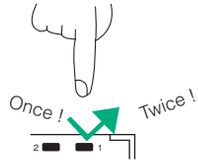
1. Set the operation selector switch to TEA. T flashes.

2. Block the light beam with detectable object, this will set the light blocking state.

Example for through-beam type



3. Press the channel-set button twice, to set the correct channel.



4. Set the operation selector switch back to RUN to complete.

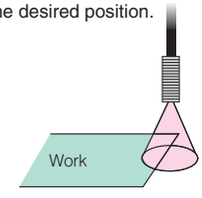
For reflective type

Use of a reflective-type fiber optic cable at the maximum sensitivity may cause inadequate light blocking. Be sure to use a work for sensitivity setting.

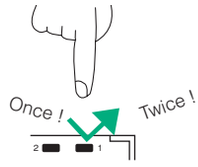
Work positioning setting

1. Set the operation selector switch to TEA. T flashes.

2. Place the detectable object at the desired position.



3. Press the button twice to set the correct channel.

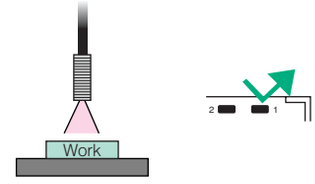


4. Set the operation selector switch back to RUN to complete.

Sensitivity setting using stationary work: auto teaching

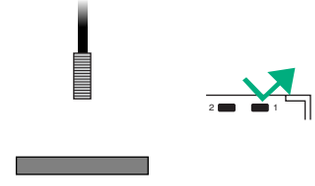
1. Set the operation selector switch to TEA. T flashes.

2. With the work in place, press once (for about 1 second) the channel-set button.



Indicator for the channel to set flashes

3. Without the detectable object, press once (for about 1 second) the channel-set button, this will set the correct channel.

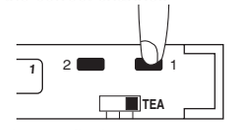


4. Set the operation selector switch back to RUN to complete.

Sensitivity setting using moving work: full auto teaching

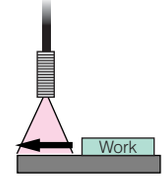
1. Set the operation selector switch to TEA. T flashes.

2. Press and hold down button to set the correct channel.

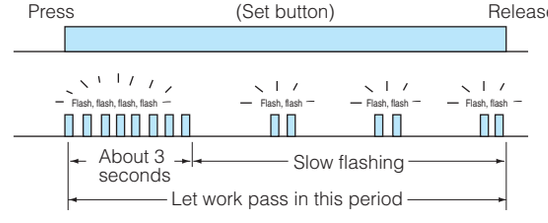


Indicator for the channel to set flashes

Let the work pass while holding down the button.



3. Confirm the indicator is flashing slowly when the work has passed and then release the set button.



4. Set the operation selector switch back to RUN to complete.

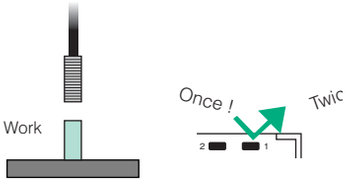
For Correct Use

Be sure to follow the instructions in the provided operation manual for correct use of the product.

Sensitivity setting for area output (a good example would be detecting different levels)

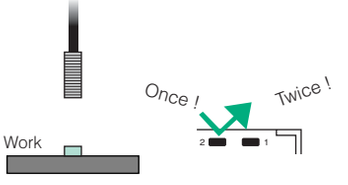
1. Set the operation selector switch to TEA. T flashes.

2. With the detectable object in place for the upper limit, press Button 1 twice (for about 1 second each time).



Flashes and goes out

3. With the detectable object in place for the lower limit, press Button 2 twice (for about 1 second each time).



Flashes and goes out

4. Set the operation selector switch back to RUN to complete.

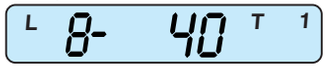
Sensitivity adjustment: manual adjustment (fine-tuning) of sensitivity

1. Set the operation selector switch to .

2. Press button once for each channel requiring sensitivity adjustment.

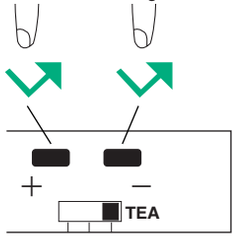
Selected channel No. and S flashes.

3. Set the operation selector switch to TEA.



The value display shows the current ON level.

4. Press the “+” or “–” button to adjust the sensitivity (holding down the button changes the indication faster).



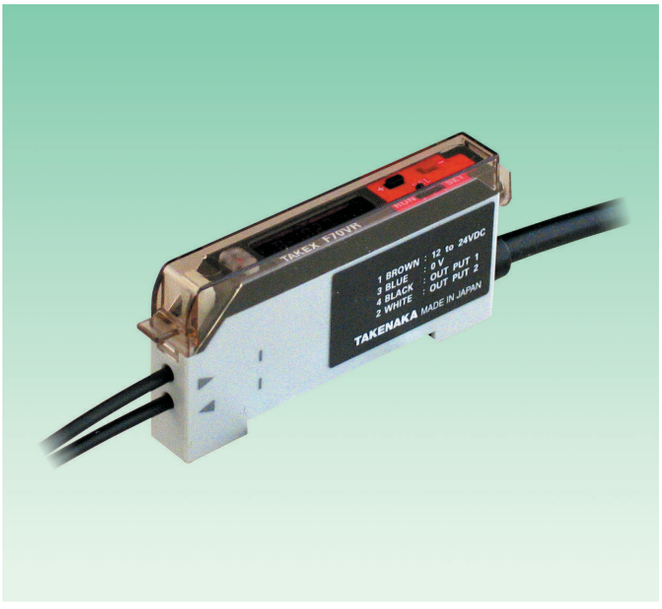
Pressing “+” increases the activation level
= SENS DOWN

Pressing “–” decreases the activation level
= SENS UP

5. When sensitivity adjustment is finished, set the operation selector switch back to RUN to complete.

F70V Series

Preset counter-equipped
Fiber optic sensors



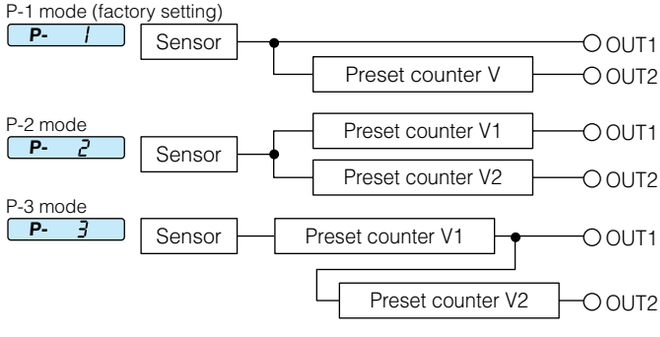
- Equipped with two preset up/down counter circuits
- Sensor on/off output and preset counter output are provided

Type

Detection method/ detecting distance	Model		Operation mode	Output mode	Light source
	NPN output	PNP output			
Dependant on fiber optic cable.	**F70VR**	**F70VRPN**	Light-ON/Dark-ON selectable	2 open collector outputs	Red LED

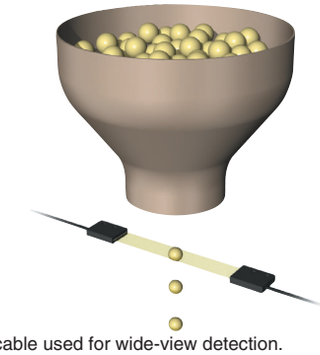
About Preset Counter

Counts the number of sensor activations/deactivations and outputs a one-shot signal when the count has reached the predefined setting (preset value).
The green indicator is illuminated while the one-shot signal is output.
The preset counter has the following three modes:



Application example

Counting works



Wide area fiber optic cable used for wide-view detection. Outputs a signal when the predefined number of falling works has been counted, eliminating the need for a separate counter unit.

Rating/Performance/Specification

Rating/performance	Type	**NPN** output type	**PNP** output type
	Model	**F70VR**	**F70VRPN**
	Detection method	Through-beam type, reflective type	
	Detecting distance	(Dependant on fiber optic cable)	
	Power supply	12~24V DC ±10% / Ripple 10% max.	
	Current consumption	39 mA max.	50 mA max.
	Control output	2 open collector outputs	
	Output mode	OUT 1: sink current 100 mA (30 VDC max.) OUT 2: sink current 50 mA (30 VDC max.) Residual voltage: 1 V or less	OUT 1: source current 100 mA (30 VDC max.) OUT 2: source current 50 mA (30 VDC max.) Residual voltage: 1 V or less
	Operation mode	Light-ON/Dark-ON selectable	
	Timer	On delay/off delay/on-off delay/disabled selectable	
		Delay time: 40 ms fixed	
	Response time	1 ms max.	
	Accessory	Mounting bracket / Operation manual	
Specification	Light source (wavelength)	Red LED (660nm)	
	Indicator	Operation indicator: OUT 1 = Orange LED / OUT2 = Green LED	
	Display	LCD display with backlight	
	Preset counter	Single preset counter: 1 mode / Double preset counter: 2 modes	
	Output	One-shot signal	
	Output signal length	Selectable between 50 ms, 100 ms, 200 ms, 500 ms and 1 s (factory setting: 100 ms)	
	Counter setting	Variable between 2 and 9999	
	Switch	2 set buttons / Mode selector switch: RUN/SELECT/SET	
	Teaching method	Full auto teaching / Auto teaching	
	Teaching input	Set button	
	Short circuit protection	Provided	
	Material	Polycarbonate	
	Connection	Permanently attached cord (outer dimension: dia. 4.8) 0.2sq. 4 core 2 m length	
	Mass	Approx. 80 g (including mounting bracket)	

Environmental Specification

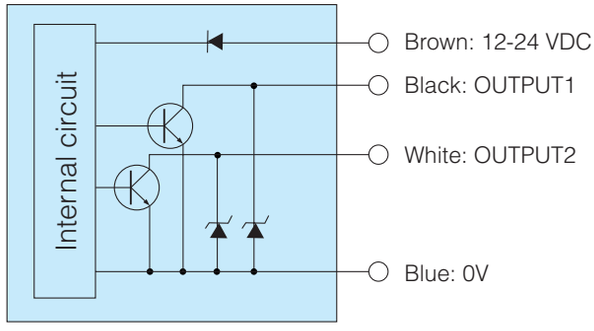
Environment	Ambient light	Incandescent lamp: 10,000 lx max. / Sunlight: 20,000 lx max.
	Ambient temperature	–25 ~ +55 ºC Storage: –40 ~ +70 ºC (non-freezing)
	Ambient humidity	35~85%RH (non-condensing)
	Vibration	10~55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction
	Shock	500 m/s² / 3 times each in 3 directions

For different types and specifications of fiber optic cables, see pp. 59-.

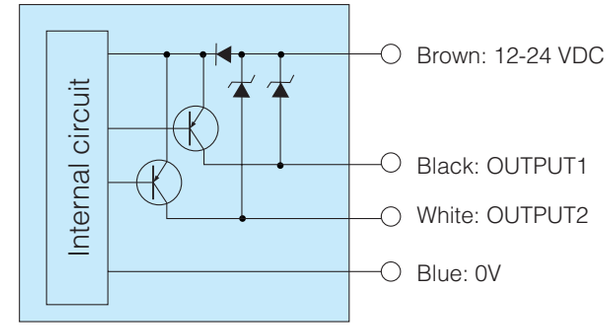
F70V

Input/Output Circuit and Connection

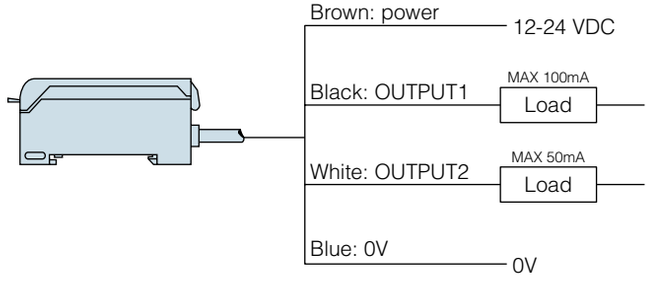
- NPN output



- PNP output

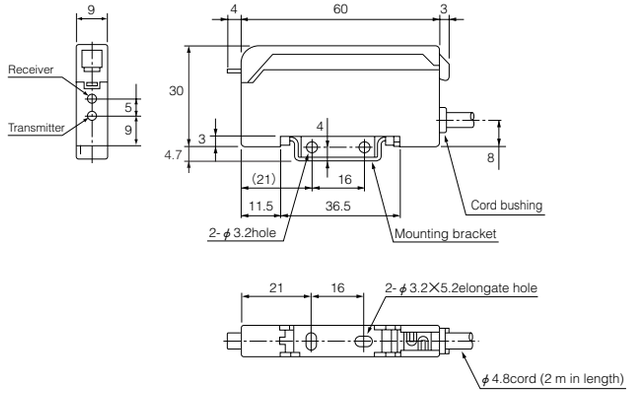


- Connection



- To extend the cord, use wires of at least 0.3 mm² and limit the length to within 100 m.

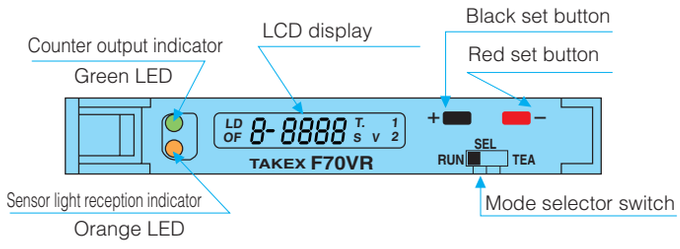
Dimensions (in mm)



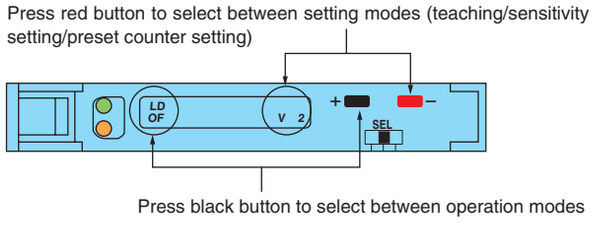
For Correct Use

Be sure to follow the instructions in the operation manual provided for correct use of the product.

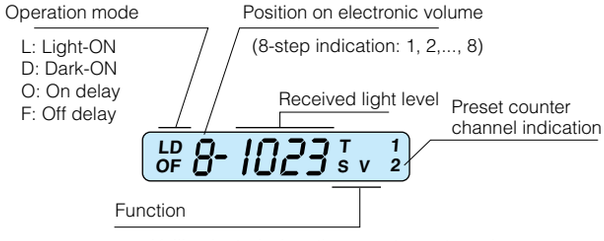
Part names



Operation and setting mode selection

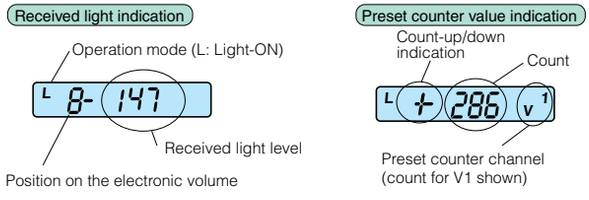


LCD display

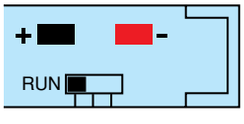


Switching between indications

The display switches between indications for received light level and preset counter value.
To switch between indications, with the selector switch at the RUN position, press the black button.

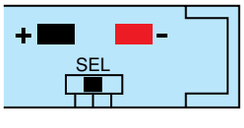


Overview of operation



Black button: Switches between indications

Red button: Switches between preset count-up and count-down displays.



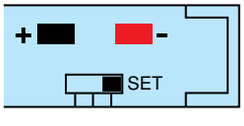
Black button: Switches between operation modes including Light-ON, Dark-ON and timer functions.

Red button: Selects between operation modes.

T: Teaching

S: Sensitivity setting

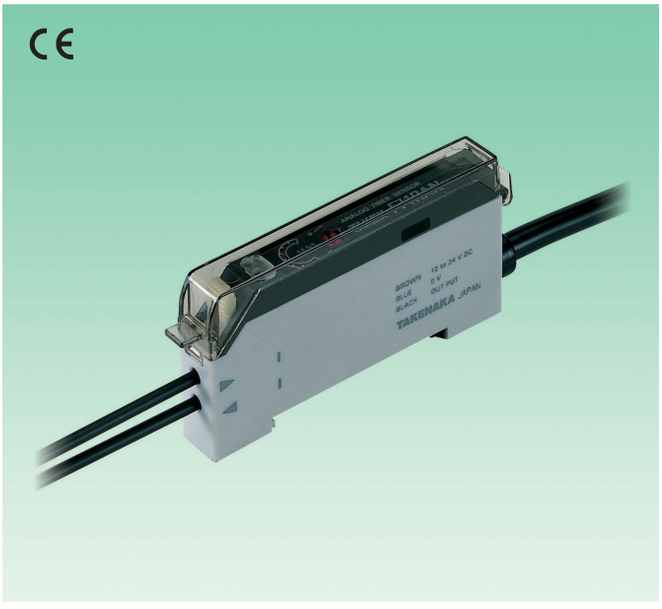
V, V1, V2: Preset value setting



Operation mode

T	Teaching: Press the red button for teaching.
S	Increase/decrease the sensitivity.
V	View/set the preset value.

F71RAN Series



- Ultra-slim 9-mm body
- 8-turn adjustment with indicator for fine-tuning
- Red LED allows for checking of illumination

Type

Type / Detection method	Detecting distance	Model	Operation mode	Output mode
Fiber type Through-beam Reflective (Dependant on fiber optic cable)	Dependant on fiber optic cable, light source, etc.	**F71RAN**	Voltage output in proportion to received light intensity	Effective voltage range: 2~8 V

- "White LED" is used for light emitting element

  A model that uses white LED as the light emitting element is available separately.
  Model.: F71WAN

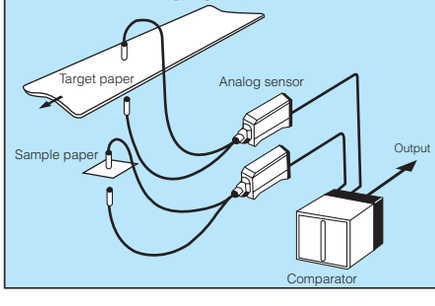
- Applicable comparator

  (ANP Series)

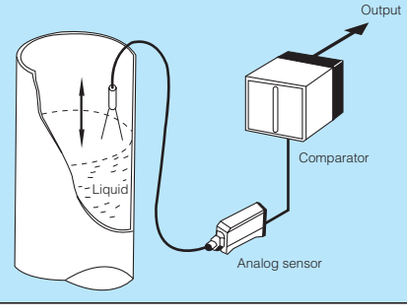
(See P. 612 for details)

Application example

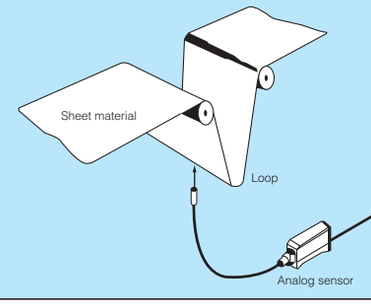
Comparative detection of thickness of paper, etc.



Liquid level detection



Loop control



Rating/Performance/Specification

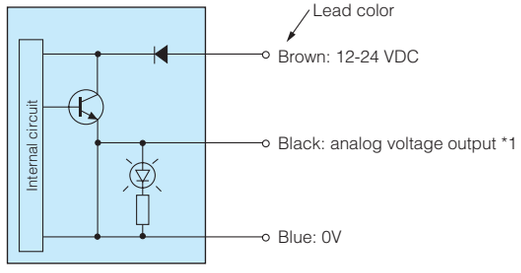
	Model	F71RAN
Rating/performance	Detection method	Fiber type
	Power supply	12~24 VDC ± 5 % / Ripple: 2% max.
	Current consumption	30 mA max.
	Output mode	Effective voltage range: 2~8 V (NPN emitter follower)*
	Operation mode	Voltage output in proportion to received light intensity (current 3 mA max.)
	Response time	Rise from 2 to 8 V in 10 ms max.
		Fall from 8 to 2 V in 25 ms max.
	Temperature drift	0.3%/ ºC max. at –10 ~ +50 ºC
	Output ripple	80 mV max.
Specification	Light source (light wavelength)	Red LED (680 nm)
	Indicator	Power (green) / Light intensity (orange)
	Case material	Case: heat-resistant ABS / Cover: polycarbonate
	Connection	Permanently attached cord (outer dimension: dia. 4.8) 0.2sq, 3 core 2 m length
	Mass	Approx.90 g (including 2-m cord and mounting bracket)

* The range may be 1~9 V depending on the characteristics of the individual products and fiber optic cables.

Environmental Specification

Environment	Ambient light	Incandescent lamp: 10,000 lx max.
	Ambient temperature	–25 ~ +55 ºC (non-freezing)
	Ambient humidity	35~85%RH (non-condensing)
	Protective structure	IP40
	Vibration	10~55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction

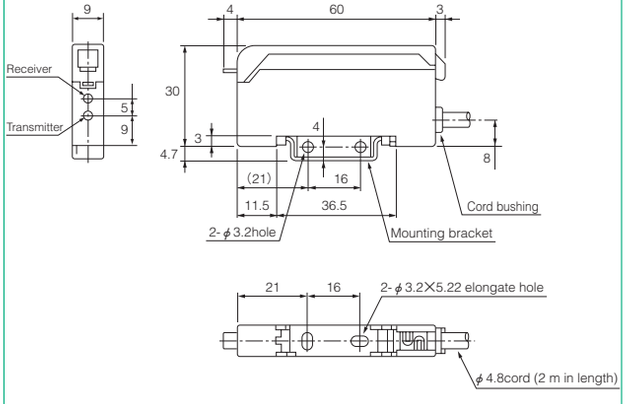
Input/Output Circuit and Connection



*1: Output current: 3 mA
Effective voltage range: 2~8 V

Dimensions (in mm)

CAD



Detecting Distance with Different Fiber Optic Cables (Typical Example)

Detection method	Fiber optic cable model	Detecting distance (mm)
Through-beam	FT105BC	120 mm
	FT8EBC	30mm
	FT5YBC	8mm
	FTS5BC	70mm
	FTSV73BC	80 mm
	FTL716BC	10mm
	GTH520J	60mm

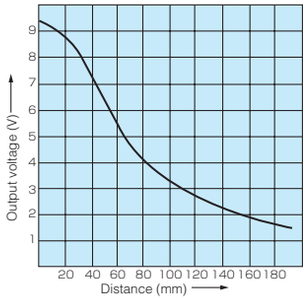
Detection method	Fiber optic cable model	Detecting distance (mm)
Reflective Detection object: 50mm□ white non-gloss paper	FR105BC	50 mm
	FR108BC	30mm
	FXN84BC	10mm
	FRS8BC	3mm
	FRL732BC	20mm
	FRSV55BC	8mm
	GXH520J	10mm

For specifications, dimensions, etc. of fiber optic cables, see pp. 59-.

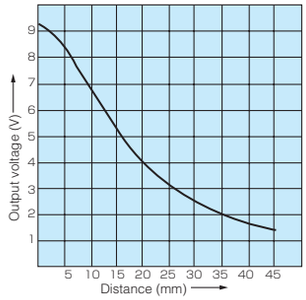
F71RAN

Distance-Output Characteristics (Typical Example) with F71RAN + Different Fiber Optic Cables (50 mm□ white non-gloss paper used as detection object for reflective types)

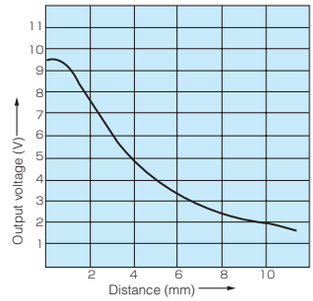
FT105BC(through-beam)



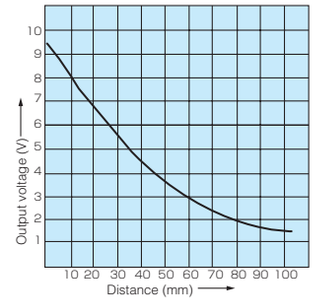
FT8EBC(through-beam)



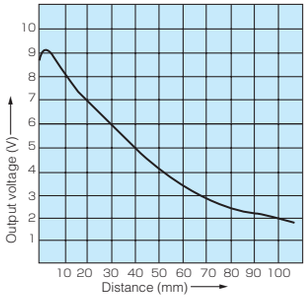
FT5YBC(through-beam)



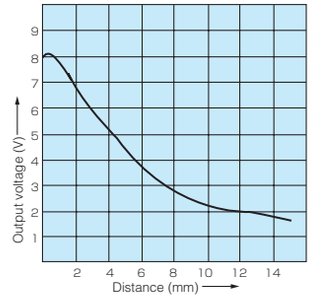
FTS5BC(through-beam)



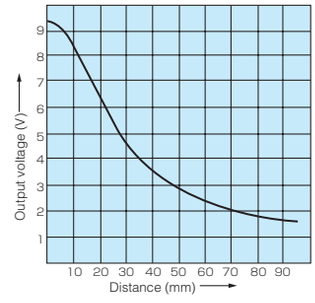
FTSV73BC(through-beam)



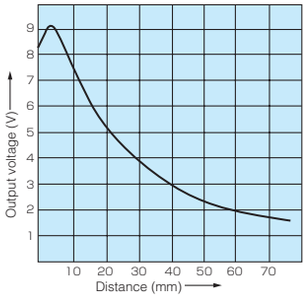
FTL716BC(through-beam)



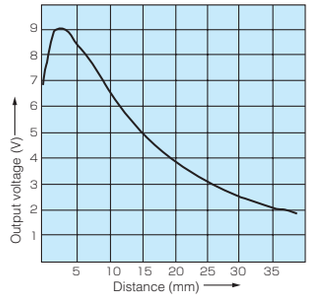
GTH520J(through-beam)



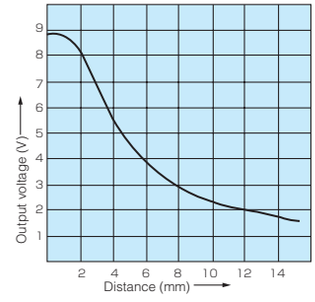
FR105BC(reflective)



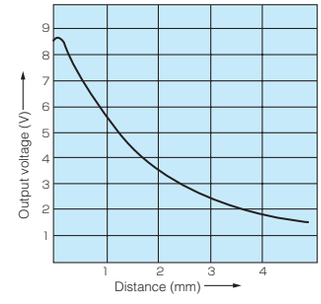
FR108BC(reflective)



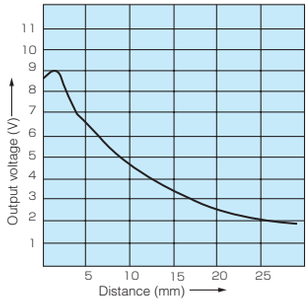
FXN84BC(reflective)



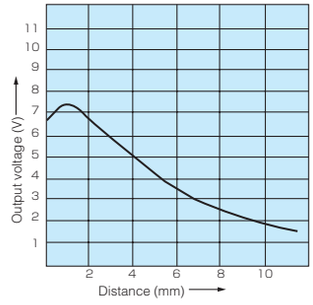
FRS8BC(reflective)



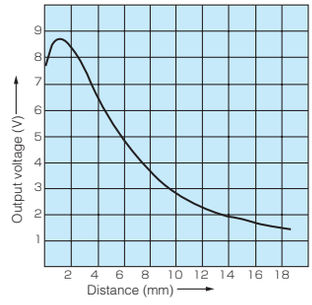
FRL732BC(reflective)



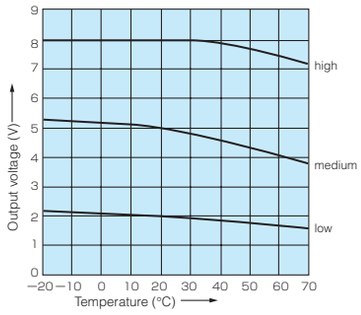
FRSV55BC(reflective)



GXH520J(reflective)



Temperature Characteristics (Typical Example)

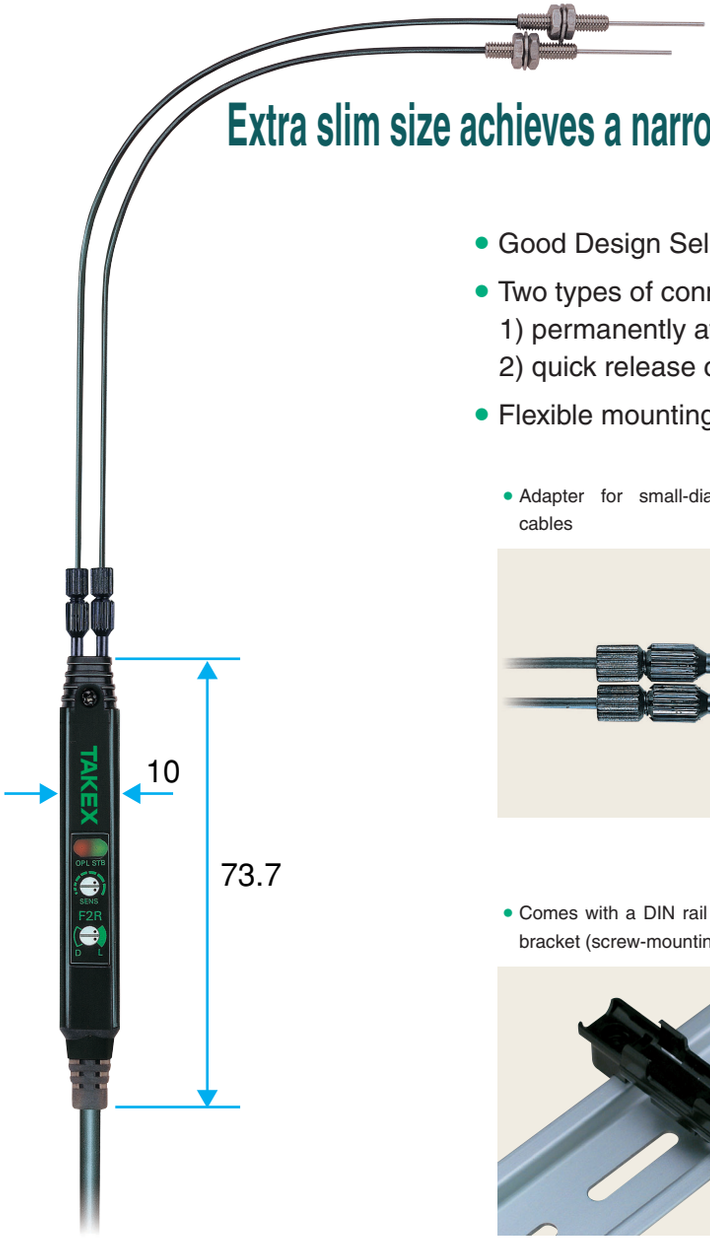


The graph shows characteristics based on temperature variations for high, medium and low output voltage settings with the same detecting position.

For Correct Use

- Do not use sensor outdoors or in a place subject to a direct disturbing light surface.
- Analog voltage takes about 30 minutes to stabilize after power-up. For detections requiring accuracy, supply power well in advance. Fluctuations of about 100 mV should be expected.

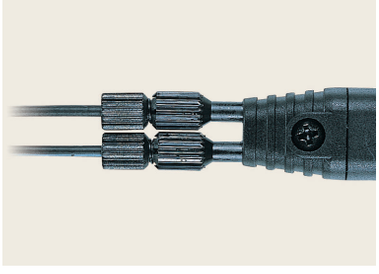
- Amazingly slim size
  (8 x 10 x 73 mm)
- Low cost
  - NPN and PNP output types are available
  - High-speed response of 500 μs



Extra slim size achieves a narrow appearance and provides ease of use

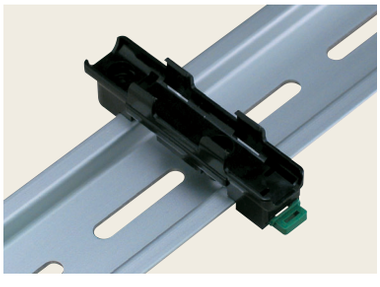
- Good Design Selection
- Two types of connections available:
  1) permanently attached cord and
  2) quick release connector
- Flexible mounting

- Adapter for small-diameter fiber optic cables



- Also allows mounting with zip-tie bands

- Comes with a DIN rail (35 mm) mounting bracket (screw-mounting also available)



- Connector type (DIN compatible) available for single-touch replacement of amplifier

Type

Detection method /detecting distance	Model	Light source	Operation mode	Output mode	Remarks
Dependant on fiber optic cable.	**F2R**	Red LED	Light-ON/ Dark-ON selectable (with selector switch)	NPN open collector	
	F2R-J				Connector type
	F2RPN			PNP open collector	
	F2RPN-J				Connector type

- Connector-type set models F2R-JC3 and F2RPN-JC3 come with a cord with connector model F2-C3.
- For details, see “Connector type models” below.

For different types of fiber optic cables, see pp. 59-.

Rating/Performance/Specification

	Type	NPN output type		PNP output type	
	Model	**F2R**	**F2R-J**(Note)	**F2RPN**	**F2RPN-J**(Note)
Rating/performance	Detection method	Through-beam type, reflective type (Dependant on fiber optic cable)			
	Detecting distance	Dependant on fiber optic cable			
	Power supply	12~24V DC ±10% / Ripple 10% max.			
	Current consumption	25mA max.			
	Output mode	NPN open collector output Rating: sink current 100 mA (30 VDC max.)		PNP open collector output Rating: source current 100 mA max.	
	Operation mode	Light-ON/Dark-ON selectable (with selector switch)			
	Response time	500 ms max.			
	Hysteresis	Up to 10% of detecting distance			
Specification	Light source (wavelength)	Red LED (660nm)			
	Indicator	OP.L: operation indicator (red LED) STB: stability indicator (green LED)			
	Volume (VR)	SENS : Sensitivity adjustment volume provided			
	Switch (SW)	Light-ON/Dark-ON selector switch; L: Light-ON/D: Dark-ON			
	Short circuit protection	Provided			
	Case Material	Noryl (filler: styrene elastomer)			
	Connection	Permanently attached cord (outer dimension: dia. 3.5) 0.2sq. 3 core 2 m length	Connector type (cord with connector separately available)	Permanently attached cord (outer dimension: dia. 3.5) 0.2sq. 3 core 2 m length	Connector type (cord with connector separately available)
	Mass	Approx. 40 g	Approx. 65 g	Approx. 40 g	Approx. 65 g
	Accessory	Screwdriver for operating sensitivity adjustment volume and Light-ON/Dark-ON switch, DIN rail mounting bracket (material: polycarbonate)			

Environmental Specification

Environment	Ambient light	3,000 lx max.
	Ambient temperature	–25 ~ +55 °C (non-freezing)
	Ambient humidity	35~85%RH (non-condensing)
	Protective structure	IP65
	Vibration	10~55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction

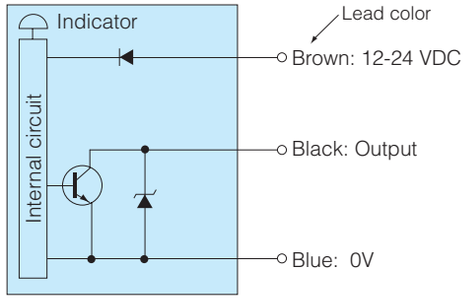
《Connector type models》

Type		Amplifier only	Amplifier and cord with connector	Cord with connector only
Model	NPN type	**F2R-J**	**F2R-JC3**	**F2-C3**
	PNP type	**F2RPN-J**	**F2RPN-JC3**	

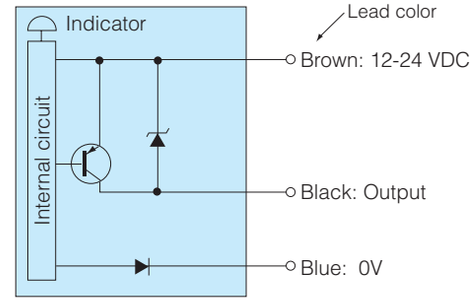
The cord with connector contains 0.2sq. 3 core 2.5 m length

Input/Output Circuit and Connection

- NPN output

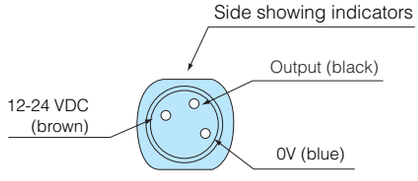


- PNP output



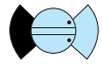
The output transistor turns off when load short circuit or overload occurs.
Check the load and turn the power back on.

- Connector type (-J) pin assignment

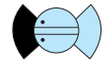


Operation Mode Switching

Light-ON



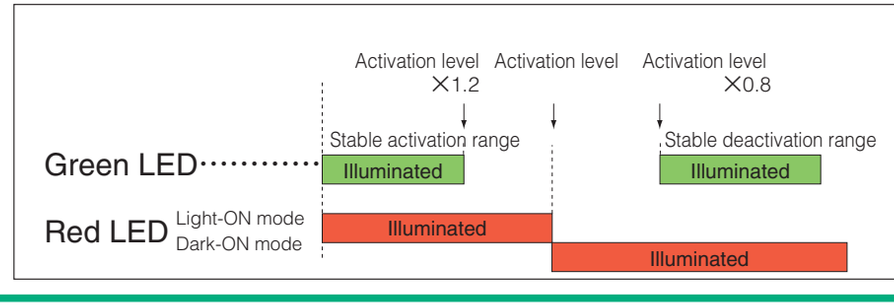
Dark-ON



For Light-ON mode: Set the switch to L (Light).
For Dark-ON mode: Set the switch to D (Dark)

About Indicators

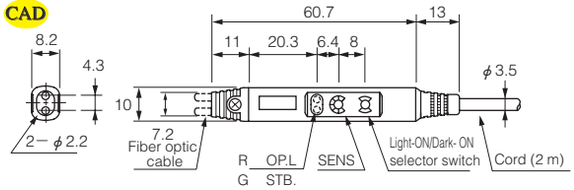
- The operation indicator (red LED) and stability indicator (green LED) show the light intensity levels described in the figure below.
- After light axis and sensitivity adjustments have been completed, repeat activation and deactivation by placing and removing the detectable object to make sure that the sensitivity is with in the stable activation/deactivation range.
- Setting within the stable range increases reliability against variations in the environment after setting.

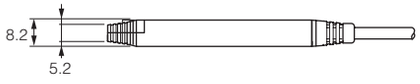


Dimensions (in mm)

F2R, F2R-PN (permanently attached cord)

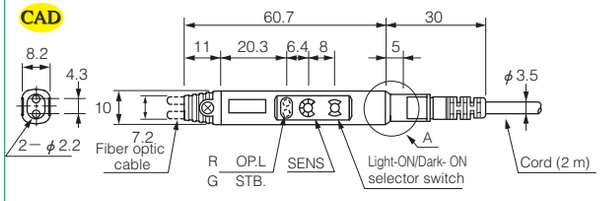
CAD

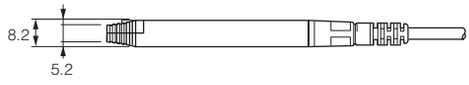




F2R-J, F2RPN-J (connector type)

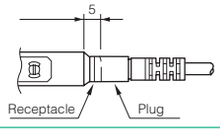
CAD





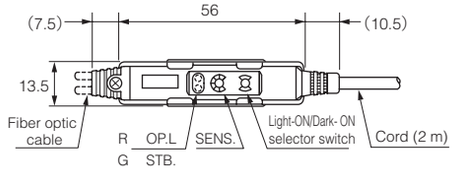
(With separately available cord with connector model F2-C3 attached)

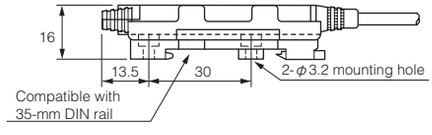
Detail of A

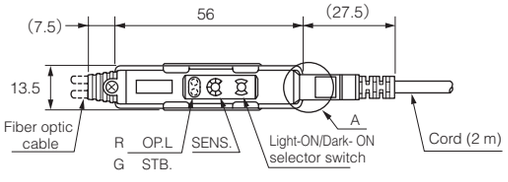


- With DIN rail mounting bracket attached

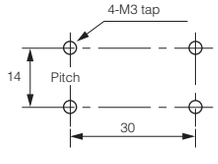
CAD







- Pitch for adjacent screw mounting (14 mm)

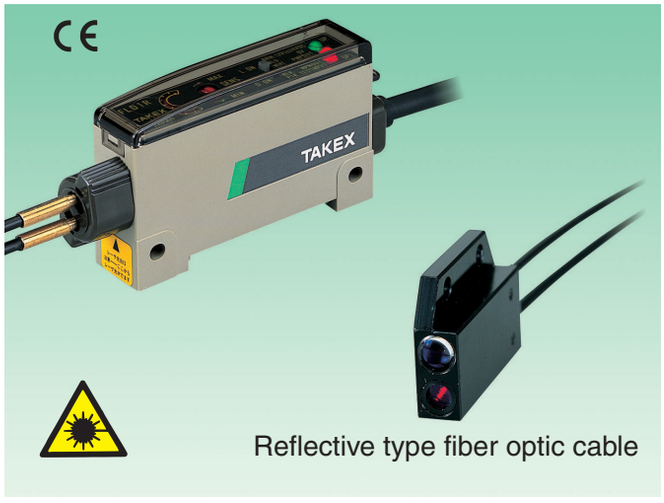


Attaching fiber optic cables

- Loosen the upper screw and insert a fiber optic cable. The insertion may feel stiff at some point, which is due to the packing material the fiber optic cable needs to pass through. Be sure to insert all the way until it stops and then tighten the screw. The tightening torque should not exceed 0.3 N·m.
- When using a small-diameter fiber optic cable, attach the provided adapter first.

FLD1R Series

Laser type
Fiber optic sensors



Reflective type fiber optic cable

Employs red semiconductor laser (class 2)

- Visible small spot allows confirmation of detecting position
- Small object of 0.1 mm can be detected
- Ideal for detecting end of thin object such as wafer mapping, etc.
- Light emission stop function is convenient as a safety measure and inspection at start of operation

Take safety measures according to the operation manual

Type

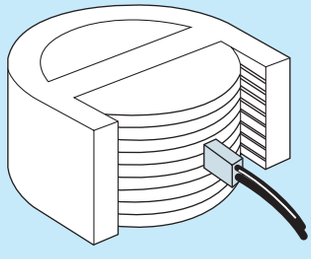
Detection method	Detecting distance	Model	Light source	Operation mode	Output mode
Reflective	20～120㎜	Amplifier **FLD1R**	Red semiconductor laser (class 2)	Light-ON/ Dark-ON selectable	NPN, PNP open collector
		Fiber optic cable **FR720LD**			

Applications

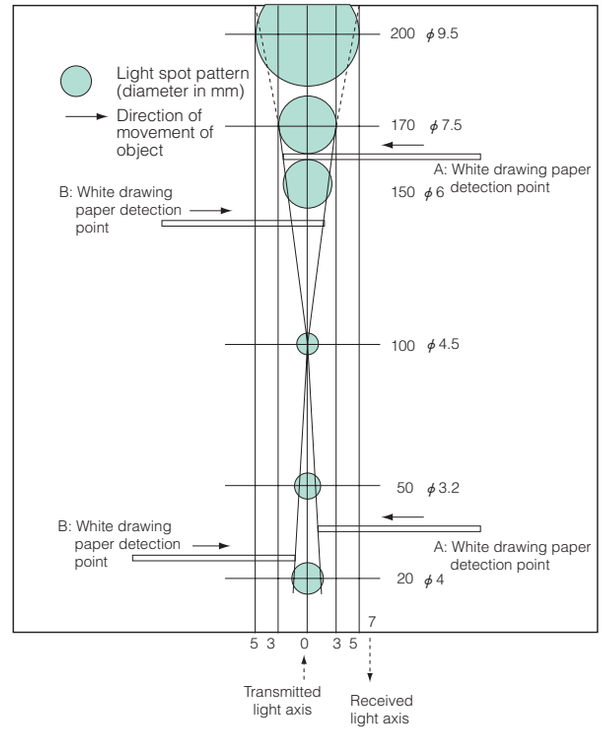
Wafer detection

Carrier movement is controlled by the detection of wafers.

The small spot of the laser beam achieves reliable detection.



Directional Characteristics (Typical Example)



Rating/Performance/Specification

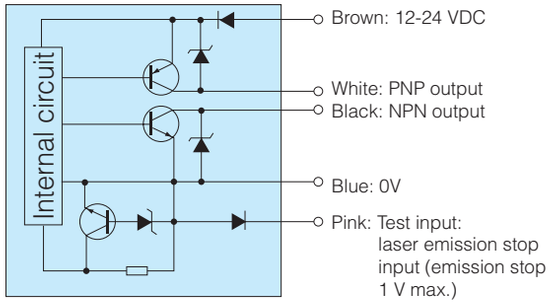
Amplifier

Rating/performance	Type	Laser type fiber optic sensor
	Model	**FLD1R**
	Power supply	12~24 VDC ± 10 % / Ripple: 10% max.
	Current consumption	38 mA
	Output mode	NPN/PNP open collector 100 mA (30 VDC) max.
	Operation mode	Light-ON/Dark-ON selectable
	Laser light emission stop input	Closed: stopped / Open: emitted / Contact: open collector input (Closed: L = 1 V max.)
	Response time	0.5 ms max.
Specification	Light source	Red semiconductor laser (650 nm) class 2
	Indicator	OP.L: operation indicator (red) / STB: stability indicator (green)
	Volume	Sensitivity adjustment volume provided (8-turn without stopper)
	Switch	Light-ON/Dark-ON selector switch provided
	Short circuit protection	Provided
	Material	Case: heat-resistant ABS / Cover: polycarbonate
	Connection	Permanently attached cord (outer dimension: dia. 4.5) 0.2sq. 5 core 2 m length
	Mass	Approx. 90 g (including cord and mounting bracket)

Fiber optic cable

Model	**FR720LD**
Type	Reflective type
Detecting distance	20 ~ 120mm
Spot diameter	About ϕ 5 (at distance of 100 mm)
Smallest allowable detection object	ϕ 0.1 (Detecting distance: 30~60 mm / Sample: copper wire)
Allowable bending radius	R30
Fiber optic cable length	2 m (uncuttable)
Material	Plastic fiber optic cable (polyethylene-covered)
Applicable amplifier	FLD1R
Mass	About 45 g

Input/Output Circuit and Connection



- Slow starting is employed for laser emission and illumination can be confirmed about 0.5 seconds after power-up or emission stop reset.
- The output transistor turns off when the load short circuits or an overload occurs.
  Eliminate any short circuit or overload state and then turn the power back on for reset
- Short-circuiting the pink and blue leads (no-voltage contact or NPN open collector) stops the laser beam.

For Correct Use

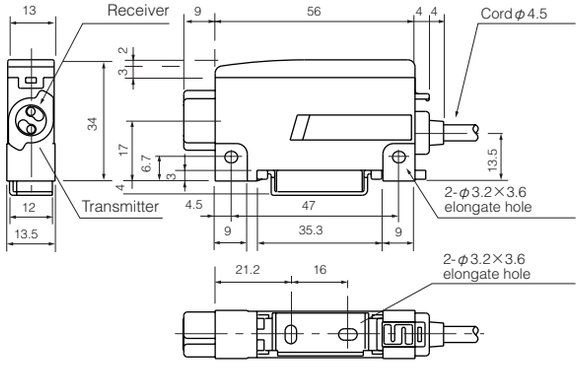
- The semiconductor laser falls under Class 2 as defined in JIS C 6802 “Safety of Laser Products.” Never look straight into the illuminated laser beam, which may damage the eye. This laser does not affect human skin.
- Use correctly and safely according to the operation manual provided.

For Correct Use

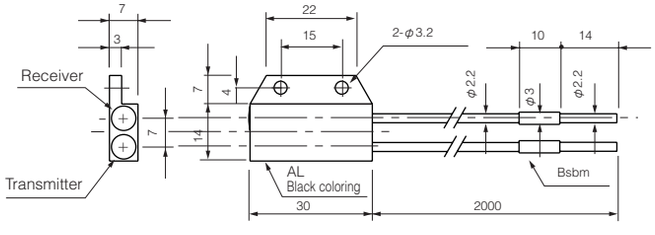
Ambient light	3,000 lx max.
Ambient temperature	–10 - +40 °C (non-freezing)
Ambient humidity	35-85%RH (non-condensing)
Protective structure	IP 66 (with protective cover attached)
Vibration	10-55 Hz / 1.5 mm amplitude / 3 times each in 3 direction

Dimensions (in mm)

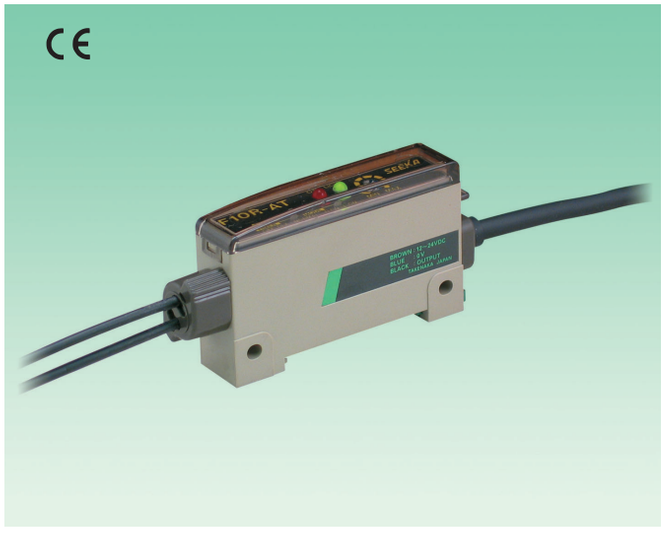
Amplifier CAD



Fiber optic cable CAD



F10R-AT



A high-performance pulse amplification method is used for the detection of minor changes

- The light intensity reference point is automatically captured and stored for simple sensitivity adjustment
- Visible red LED light spot

Type

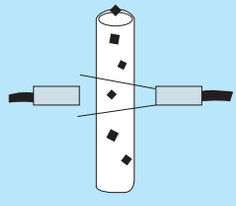
Detection method	Detecting distance	Model	Light source	Operation mode	Output mode
Through-beam Reflective (Dependant on fiber optic cable)	Dependant on fiber optic cable	**F10R-AT**	Red LED	・Light-ON/ Dark-ON selectable ・Timer mode selectable (With switch)	NPN open collector

This sensor detects slight changes in light intensity generated by object movement with in the detection area. For this reason, only a moving object can be detected even if a stationary object (fixed object in the background) and a moving detection object are on the same mirror-like material such as a stainless-steel plate or stationary and moving objects are of the same color.

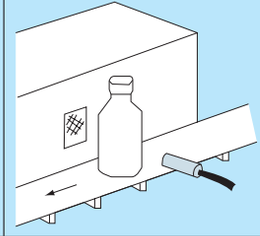
For different models and specifications of fiber optic cables, see pp. 59-.

Applications

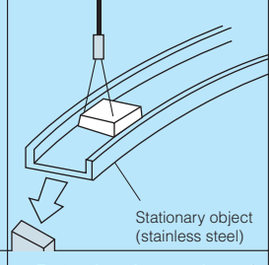
- Detection of falling minute objects such as chip components



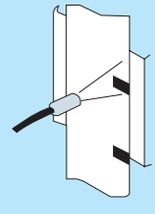
- Detecting the passage of transparent containers



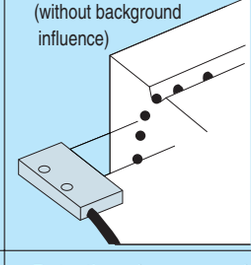
- Detecting objects of the same material as background



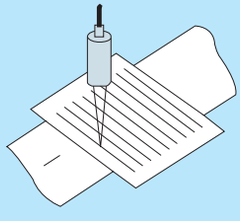
- Detecting the passage of register marks



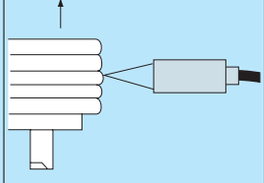
- Detection of minute objects passing with in a large area (without background influence)



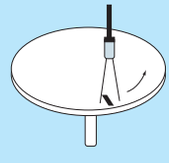
- Detection of ruled lines



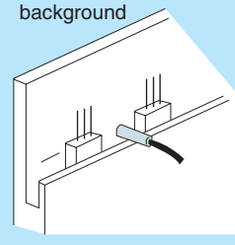
- Checking the number of copies of booklets, catalogs, etc.



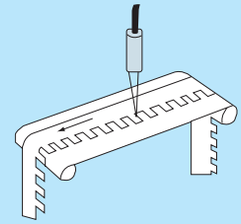
- Detecting the number of rotations



- Detecting the passing of pins without influence of background



- Detection of passage of concave portions



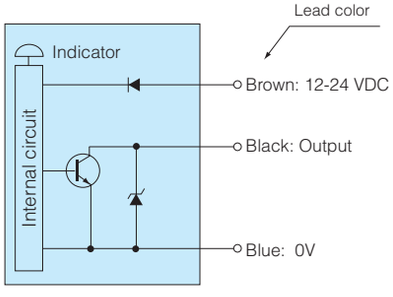
Rating/Performance/Specification

Rating/performance	Type	Pulse amplification type fiber optic sensor
	Model	**F10R-AT**
	Detection method	Through-beam type, reflective type (Dependant on fiber optic cable)
	Power supply	12~24V DC ±10% / Ripple 10% max.
	Current consumption	40mA max.
	Output mode	NPN open collector output Rating: 100 mA, 30 V max.
	Operation mode	Light-ON/Dark-ON selectable Timer mode selectable (With switch)
	Response time	0.5ms max.
	Minimum moving speed	0.5 Hz min.
Specification	Light source (wavelength)	Red LED (660nm)
	Indicator	LIGHT: light reception indicator (green LED) O.P: operation indicator (red LED)
	Volume (VR)	Sensitivity adjustment volume provided
	Switch (SW)	Light-ON/Dark-ON selector switch/timer selector switch provided
	Short circuit protection	Provided
	Case material	Case: heat-resistant ABS / Cover: polycarbonate
	Connection	Permanently attached cord (outer dimension: dia. 4.5) 0.2sq. 3 core 2 m length
	Mass	Approx. 90 g (including cord and mounting bracket)

Environmental Specification

Environment	Ambient light	Incandescent lamp: 10,000 lx max./ Sunlight: 20,000 lx max.
	Ambient temperature	–25 ~ +55 °C (non-freezing)
	Ambient humidity	35~85%RH (non-condensing)
	Protective structure	IP 66 (with protective cover attached)
	Vibration	10~55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction

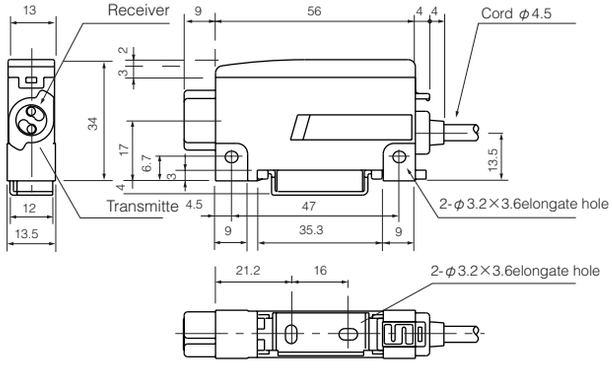
Input/Output Circuit and Connection



The output transistor turns off when load short circuit or overload occurs.
Check the load and turn the power back on.

Dimensions (in mm)

CAD

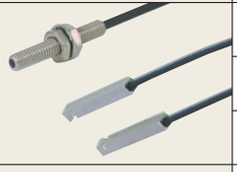


Fiber Optic Cables

Fiber Optic Cables

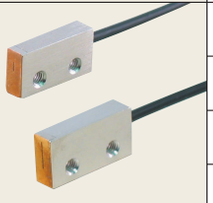
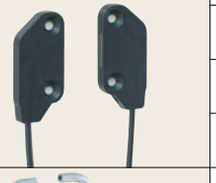
Through-Beam type

Identify models by numbers for search
(for specifications, dimensions, etc.)

Type	Tip appearance (typical)	Model No. (made-to-order models marked with ●)	Search ID No.	Prominent feature	Detecting distance (mm) (inapplicable combinations marked with-)				
					F80R		F70R F70AR	F71R	F2R
					Long-distance	High-speed			
Long-distance		FT105BC	1	M4 screw, detecting long-distance	1800	1000	1000	600	160
Lens-integrated		FT7202BC	2	Long-distance with lens	2000	1100	1100	660	120
General-purpose		FT8EBC	3	M3 screw, low-cost	470	260	260	150	60
		FT8BC	4	M3 screw, small-diameter	230	130	130	75	30
		FT108BC	5	M3 threaded short head	860	480	480	280	100
		FT5BC	6	M4 screw	830	460	460	270	80
		FT7BC	7	M4 screw with M2.6 screw tip	830	460	460	270	80
		FT81BC	8	φ1.5 unthreaded	230	130	130	75	30
		FT3BC	9	φ2.9 unthreaded	830	460	460	270	80
Side-view		FTV74BC	10	φ4 unthreaded	830	460	460	270	80
		FTV7BC	11	M5 screw	830	460	460	270	80
		FTV502YBC●	12	4-mm square head	470	260	260	160	50
Flexible		FT91YBC●	13	φ1.5 unthreaded, allowable bending radius 4 mm	180	100	100	60	20
		FT19YBC	14	M3 screw, allowable bending radius 1 mm	135	75	75	48	15
		GTKシリーズ	15	M3 screw, allowable bending radius 3.5 mm	—	—	—	—	60
		FT5YBC	16	M4 screw, allowable bending radius 1 mm	700	380	380	230	70
Narrow-view		FTN5BC	17	M4 screw, long-distance	2300	1300	1300	750	350
Side-view		FTVN5BC	18	φ4 unthreaded, long-distance	2200	1200	1200	720	300
		FTVN501BC	19	4-mm square head	2200	1200	1200	720	300
SUS tube		FTS88BC	20	M3 screw, SUS 15 mm	230	130	130	75	30
		FTS53BC	21	M4 screw, SUS 35 mm	230	130	130	75	30
		FTS8BC	22	M3 screw, SUS 70 mm	230	130	130	75	30
		FTS5BC	23	M4 screw, SUS 70 mm	230	130	130	75	30
Side-view		FTSV82BC	24	φ2 unthreaded, SUS 20 mm	130	70	70	40	15
		FTSV821BC●	25	φ2 unthreaded, SUS 20 mm	20	10	8	4	—
		FTSV73BC	26	φ3 unthreaded, SUS 20 mm	440	240	240	140	40
		FTSV93BC	27	φ3 unthreaded, SUS 20 mm	40	20	19	11	—
		FTSV84BC●	28	M4 screw, SUS 20 mm	130	70	70	40	15
		FTSV5BC	29	M4 screw, SUS 65 mm	500	280	280	160	60

Through-Beam type

Identify models by numbers for search
(for specifications, dimensions, etc.)

Type	Tip appearance (typical)	Model No. (made-to-order models marked with ●)	Search ID No.	Prominent feature	Detecting distance (mm) (inapplicable combinations marked with-)				
					F80R		F70R F70AR	F71R	F2R
					Long-distance	High-speed			
U-shaped		FU505BC	30	No light axis alignment required	7				
		FU712BC	31		12				
		FU715BC	32	Vibration-resistant	15				
		FU725BC●	33		25				
		FU904BC●	34	4 light axes	12				
		FU916BC●	35	16 light axes	30				
Wide area		FTL706BC	36	Detecting width 1.75 mm	300	170	170	95	30
		FTL716BC	37	Detecting width 5.5 mm	680	380	380	220	80
		FTL7165BC	38	Detecting width 11.1 mm	680	380	380	220	80
		FTL7166BC●	39	Detecting width 16 mm	680	380	380	220	80
		FTL745BC●	40	Detecting width 45 mm	540	300	300	180	60
Side-view		FTLV702BC●	41	Detecting width 5.5 mm	680	380	380	220	80
		FTVW7YBC	42	Long-distance with detecting width 10 mm	1800	1000	1000	–	–
Elbow		FT704BC	43	Depth space saving with ϕ2.5	680	380	380	220	80
Heat-resistant		FUH612BC●	44	U-shaped, heat resistance 130 ºC	12				
		FTH7BC	45	Low-cost, heat resistance 105 ºC	830	460	460	270	80
		GLT500J series	46	M4 screw, heat resistance 200 ºC	610	340	340	195	–
		GT500J series	47	M4 screw, heat resistance 200 ºC	610	340	340	195	–
		GTH500J series	48	M4 screw, heat resistance 350 ºC	610	340	340	195	–
Side-view		FTHV74BC●	49	Low-cost, heat resistance 105 ºC	830	460	460	270	80

● Detecting distance depends on light source

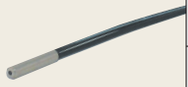
Detecting distances depend on the type of light source.

The detecting distances for individual fiber optic cable models in the table above show the values for combinations with amplifiers using red (R) LED as the light source. Detecting distances for combinations with amplifiers using green (G), blue (B) or white (W) LEDs as the light sources are reduced to about 30%.

Fiber Optic Cables

Reflective Type

Identify models by numbers for search
(for specifications, dimensions, etc.)

Type		Tip appearance (typical)	Model No. (made-to-order models marked with ●)	Search ID No.	Prominent feature	Detecting distance (mm) (inapplicable combinations marked with-)				
						F80R		F70R F70AR	F71R	F2R
						Long-distance	High-speed			
Long-distance			FR105BC	50	M6 screw, long-distance	570	320	320	190	50
General-purpose			FR83BC	51	φ3 unthreaded, small-diameter	90	50	50	30	9
			FR1083BC	52	φ3 unthreaded	360	200	200	120	40
			FR835BC●	53	φ3 unthreaded short head	190	110	110	65	20
			FR8EBC	54	M3 screw, low-cost	190	110	110	65	20
			FR8BC	55	M3 screw, small-diameter	90	50	50	30	9
			FR84BC	56	M4 screw, small-diameter	90	50	50	30	9
			FR108BC	57	M4 screw	360	200	200	120	40
			FR7BC	58	φ2.5mm head, M6 screw	320	180	180	100	35
			FR5BC	59	M6 screw, long-distance detection	320	180	180	100	35
Flexible			FR91Y10	60	φ1.5 unthreaded, allowable bending radius 4 mm	40	20	20	12	4
			FR93BC	61	φ3 unthreaded short head, allowable bending radius 4 mm	60	30	30	18	6
			FR19YBC	62	M3 screw, allowable bending radius 1 mm	40	20	13	8	3
			FR8YBC	63	M3 screw, allowable bending radius 4 mm	20	10	10	6	2
			FR84YBC●	64	M4 screw, allowable bending radius 4 mm	60	30	30	16	7
			FR194YBC●	65	M4 screw, allowable bending radius 1 mm	40	20	13	8	3
			FR5YBC	66	M6, 1 mm-pitch screw, allowable bending radius 1 mm	220	120	120	70	25
			FR7YBC	67	M6, 0.75 mm-pitch screw, allowable bending radius 1 mm	220	120	120	70	25
			GXKシリーズ	68	M6 screw, allowable bending radius 3.5 mm	—	—	—	—	20
Narrow-view	Coaxial		FXN84BC	69	M4 screw, coaxial narrow-view	40	22	22	13	5
			FXN841BC	70	M4 screw, coaxial narrow-view with φ1.5 spot	12	6	5.5	3	—
	Extra narrow-view		FR707BC●	71	Narrow-view, angle of aperture 10 degrees	30～270	30～150	30～150	30～110	—

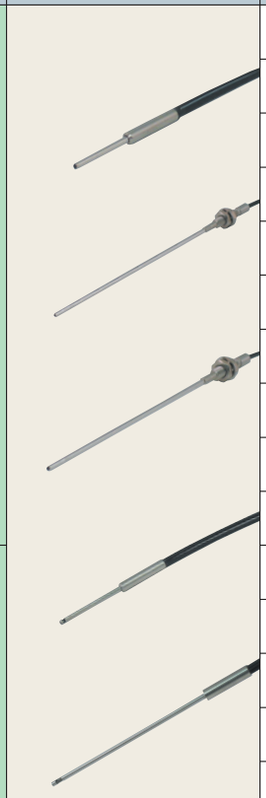
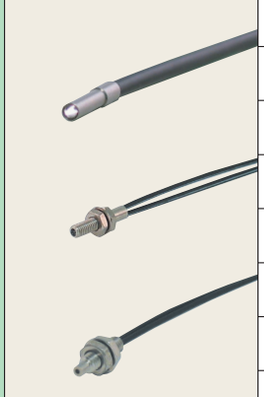
● Detecting distance depends on light source

Detecting distances depend on the type of light source.

The detecting distances for individual fiber optic cable models in the table above show the values for combinations with amplifiers using red (R) LED as the light source. Detecting distances for combinations with amplifiers using green (G), blue (B) or white (W) LEDs as the light sources are reduced to about 30%.

Reflective Type

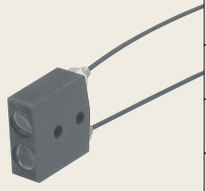
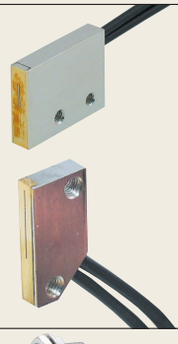
Identify models by numbers for search
(for specifications, dimensions, etc.)

Type	Tip appearance (typical)	Model No. (made-to-order models marked with ●)	Search ID No.	Prominent feature	Detecting distance (mm) (inapplicable combinations marked with-)				
					F80R		F70R F70AR	F71R	F2R
					Long-distance	High-speed			
SUS tube		**FRS83BC**	**72**	φ3 unthreaded, φ1.3 head	90	50	50	30	9
		FRS801BC●	**73**	φ4 unthreaded, SUS 22 mm	90	50	50	30	9
		FRS806BC●	**74**	M3 screw, SUS 40 mm	90	50	50	30	9
		FRS8BC	**75**	M3 screw, SUS 70 mm	90	50	50	30	9
		FRS2003Jシリーズ	**76**	M4 screw, SUS 35 mm	23	13	13	7	—
		FRS84BC	**77**	M4 screw, SUS 70 mm	90	50	50	30	9
		FRS200Jシリーズ	**78**	M4 screw, SUS 70 mm	23	13	13	7	—
		FRS53BC	**79**	M6 screw, SUS 35 mm	90	50	50	30	9
		FRS105BC●	**80**	M6 screw, SUS 40 mm	570	320	320	190	50
		FRS5BC	**81**	M6 screw, SUS 70 mm	90	50	50	30	9
Side-view		**FRSV83BC**	**82**	φ3 unthreaded, SUS 20 mm	40	20	20	12	4
		FRSV55BC	**83**	φ5 unthreaded, SUS 70 mm	90	50	50	30	10
		FRSV8BC	**84**	M3 screw, SUS 20 mm	40	20	19	10	4
		FRSV84BC●	**85**	M4 screw, SUS 70 mm	90	50	50	30	10
		FRSV5BC	**86**	M6 screw, SUS 70 mm	90	50	50	30	10
Coaxial		**FX83BC**	**87**	φ3 short head	90	50	44	25	7
		FX801BC	**88**	M3 screw	110	60	55	33	10
		FX84BC	**89**	M4 screw, φ2.5 head	90	50	44	25	7
		FX8401BC	**90**	M4 screw, for use of lens	90	50	44	25	7
		FX8404BC	**91**	M4 screw, small-diameter	110	60	55	33	10
		FX200Jシリーズ	**92**	M4 screw, P = 0.7 mm	135	75	75	45	—
		FX7BC	**93**	M6 screw, φ2.5 head	230	130	130	75	25
		FX716BC	**94**	M6 screw, P = 0.75 mm	300	170	170	100	30

Fiber Optic Cables

Reflective Type

Identify models by numbers for search
(for specifications, dimensions, etc.)

Type	Tip appearance (typical)	Model No. (made-to-order models marked with ●)	Search ID No.	Prominent feature	Detecting distance (mm) (inapplicable combinations marked with-)				
					F80R		F70R F70AR	F71R	F2R
					Long-distance	High-speed			
Limited reflection		FZ801BC	95	Ideal for PCB detection	30				—
		FZ802BC	96	Thin body of 3 mm	0～5				—
		FZ804BC●	97	Thin body of 3 mm	5～17			—	—
		FZ1901YBC	98	Limited reflection, allowable bending radius 1 mm	50				—
		FZV8301BC	99	Fits in robot hand	0～20※1				—
		FZV191YBC	100	Ideal for glass substrate detection with allowable bending radius 1 mm	0～6			—	—
Thin, side-view		FZV8203BC●	101	Thin body of 2 mm	0～19				—
		FZV8202BC●	102	Thin body of 2 mm	0～5				—
		GXZV505BJ●	103	Heat resistance 250 ºC	0～5			—	—
		GXZV605BJ●	104	Heat resistance 250 ºC	0～5				—
		GXZV612BJ●	105	Heat resistance 250 ºC	1～12				—
Wide area		FRL7W16BC	106	Detecting width 5.5 mm	170	95	95	55	25
		FRL78BC●	107	Detecting width 14 mm	270	150	150	110	20
		FRL732BC	108	Detecting width 11.1 mm	170	95	95	55	25
		FRL702BC●	109	Detecting width 20.4 mm	170	95	95	55	25
		FRLV816BC	110	Detecting width 5.25 mm, cylindrical	45	25	25	22	10
		FRLV732BC	111	Detecting width 11.1 mm	170	95	95	55	25
Elbow		FX8403BC●	112	M4 screw, coaxial reflective	100	55	55	33	10
Heat-resistant		GLX500Jシリーズ	113	M4 screw, heat resistance 200 ºC	135	75	75	45	—
		GXH500Jシリーズ	114	M4 screw, heat resistance 350 ºC	135	75	75	45	—
		GX500Jシリーズ	115	M4 screw, heat resistance 230 ºC	135	75	75	45	—
		GXSH5015J●	116	M4 screw, SUS 40 mm, heat resistance 350 ºC	90	50	50	30	—
		FRH7BC	117	M6 screw, low-cost, heat resistance 105 ºC	320	180	180	100	35

*1: Reduce the sensitivity when using with F80R or F70R/AR.

●Detecting distance depends on light source

Detecting distances depend on the type of light source.

The detecting distances for individual fiber optic cable models in the table above show the values for combinations with amplifiers using red (R) LED as the light source. Detecting distances for combinations with amplifiers using green (G), blue (B) or white (W) LEDs as the light sources are reduced to about 30%.

Special Purpose Type

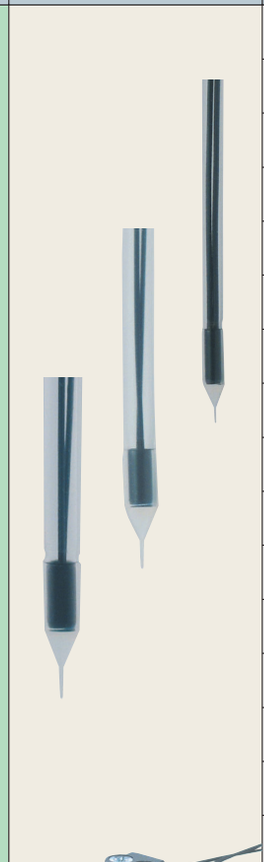
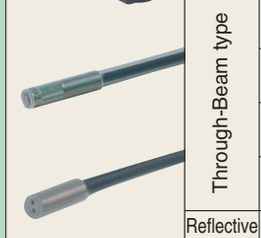
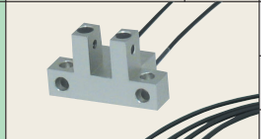
Identify models by numbers for search
(for specifications, dimensions, etc.)

Type			Tip appearance (typical)	Model No. (made-to-order models marked with ●)	Search ID No.	Prominent feature	Detecting distance (mm) (inapplicable combinations marked with-)				
							F80R		F70R F70AR	F71R	F2R
							Long-distance	High-speed			
Vacuum-proof, heat-resistant	Fiber pin connection			GTH705V●	118	1 x 10^{-8} Pa vacuum resistance allowing work detection in high-vacuum, high-temperature chambers, etc.	680	380	380	220	–
				GTH710V●			680	380	380	220	–
				GTSH705V●			680	380	380	220	–
				GTSH710V●			680	380	380	220	–
				FA7VP-M5●		Fiber pin	–	–	–	–	–
				FT7VBC-M5●		Atmosphere-side fiber	–	–	–	–	–
	Flange connection	Straight		GTHN605V●	119	Vacuum-side through-beam M4 screw with M2.6 tip	480	270	270	230	–
				GTHN610V●		Vacuum-side through-beam M4 screw with M2.6 tip	450	250	250	220	–
				GTHN615V●		Vacuum-side through-beam M4 screw with M2.6 tip	430	240	240	200	–
				GTHN620V●		Vacuum-side through-beam M4 screw with M2.6 tip	380	210	210	170	–
				GTHN705V●	120	Vacuum-side through-beam M4 screw	480	270	270	230	–
				GTHN710V●		Vacuum-side through-beam M4 screw	450	250	250	220	–
				GTHN715V●		Vacuum-side through-beam M4 screw	430	240	240	200	–
				GTHN720V●		Vacuum-side through-beam M4 screw	380	210	210	170	–
		Curved		GTSHN705V●	121	Vacuum-side through-beam M4 screw	480	270	270	230	–
				GTSHN710V●		Vacuum-side through-beam M4 screw	450	250	250	220	–
				GTSHN715V●		Vacuum-side through-beam M4 screw	430	240	240	200	–
				GTSHN720V●		Vacuum-side through-beam M4 screw	380	210	210	170	–
		Straight		GXHN405V●	122	Vacuum-side reflective ϕ4	60	35	35	30	–
				GXHN410V●		Vacuum-side reflective ϕ4	60	35	35	30	–
				GXHN705V●	123	Vacuum-side reflective M4	60	35	35	30	–
				GXHN710V●		Vacuum-side reflective M4	60	35	35	30	–
		Flange		FA7VG702●	124	Relay flange 3-ch VG-type ϕ70	–	–	–	–	–
				FA7VG703●	125	Relay flange 3-ch VG-type ϕ70	–	–	–	–	–
		Atmosphere side		FT7VGBC●	126	Free cutting on atmosphere side	–	–	–	–	–

Fiber Optic Cables

Special Purpose Type

Identify models by numbers for search
(for specifications, dimensions, etc.)

Type	Tip appearance (typical)	Model No. (made-to-order models marked with ●)	Search ID No.	Prominent feature	Detecting distance (mm) (inapplicable combinations marked with-)				
					F80R		F70R F70AR	F71R	F2R
					Long-distance	High-speed			
Liquid level detection		FL-6BC	127	Covered with PFA tube for detection of virtually any type of liquid including water, oil, chemicals, etc.	Detection occurs when sensor is immersed in liquid				
		FL-7013							
		FL-7013-02							
		FL-7013-05							
		FL-7013-1							
		FL-7161							
		FL-7161-05							
		FL-7161-1							
		FL-7161-2							
		FL-7314							
		FL-7326							
		FLH-6BC							
		FLH-7013							
		FLH-7013-02							
		FLH-7013-05							
		FLH-7013-1							
Detection of level of liquid in pipe		FU901BC	128	Mountable on translucent or transparent pipes of glass, PFA, etc. of 6~26 mm in diameter					
Chemical-resistant	 Through-Beam type	FTH7FEBC	129	Excellent oil/chemical resistance, long-distance detection	2300	1300	1300	780	230
		GTH510FEJ	130	Covered with PFA tube, heat resistance 200 ºC	1000	1000	1000	–	–
		GTH540FEJ			1800	1000			
		FTV7FEBC●	131	Through-beam side-view	990	550	550	400	100
	Reflective Type	FRH7FEBC	132	Excellent oil / chemical resistance	130	70	70	70	35
U-shaped		FU1001BC	133	Replaceable with photo micro sensor, heat resistance 115 ºC	5				
		FU1002BC	134						
		FU1004BC	135						
Wafer detection		FR706BC	136	2-ch fiber optic cable for reliable detection	130	70	70	50	–

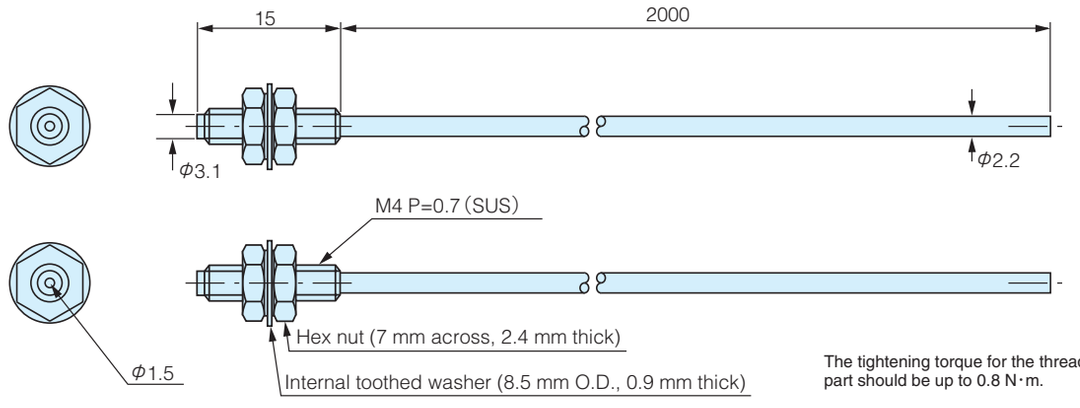
Specifications/Dimensions

(in mm)

Fiber Optic Cables

Model	FT105BC	M4 screw allowing extra long distance detection	Search ID No.	1
Detection method	Through-beam			

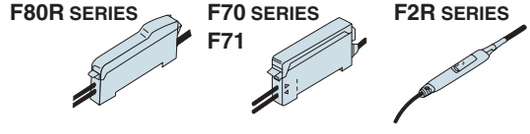
CAD



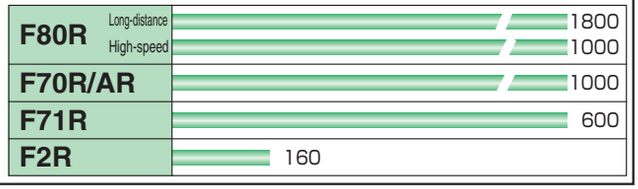
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FT105BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.5
Allowable bending radius		R45
Standard detection object diameter		φ1.5
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

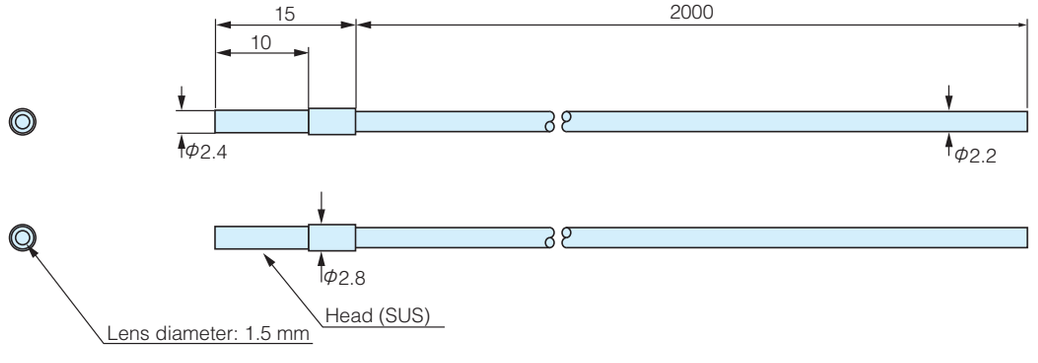


Detecting distances for individual amplifier models (mm)



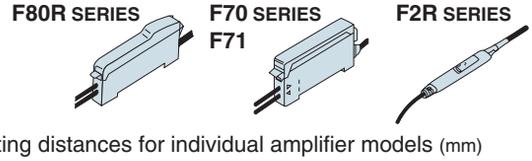
Model	FT7202BC	Long-distance lens-integrated	Search ID No.	2
Detection method	Through-beam			

CAD

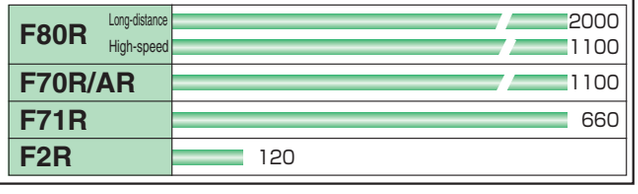


Model		FT7202BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	0.75
Allowable bending radius		R20
Standard detection object diameter		φ1.0
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

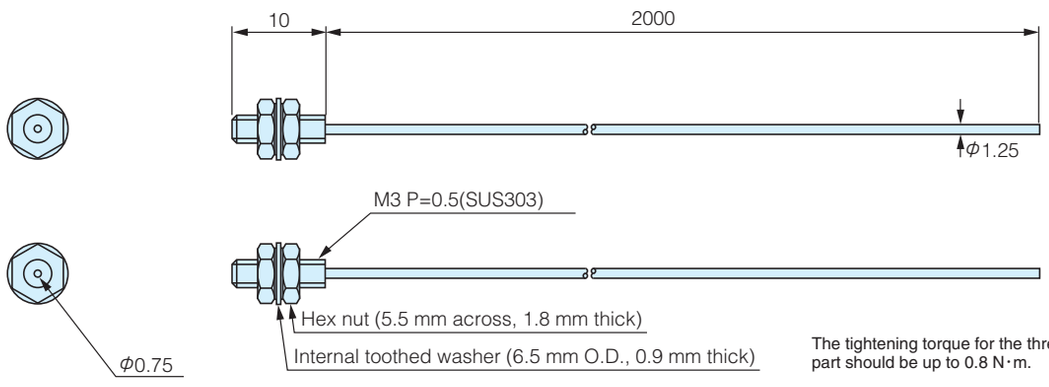


Detecting distances for individual amplifier models (mm)



Model	**FT8EBC**	M3 screw, small-diameter, low-cost	Search ID No.	3
Detection method	Through-beam			

CAD

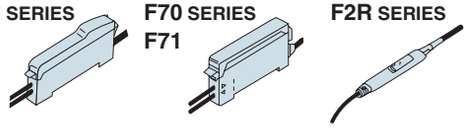


The tightening torque for the threaded part should be up to 0.8 N·m.

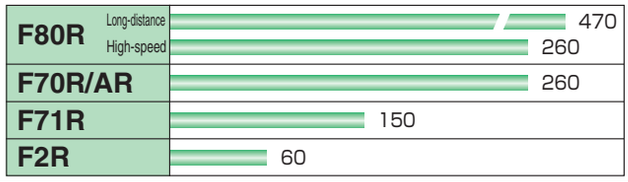
Model		**FT8EBC**
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.75
Allowable bending radius		R20
Standard detection object diameter		φ0.75
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

F80R SERIES **F70 SERIES** **F71** **F2R SERIES**

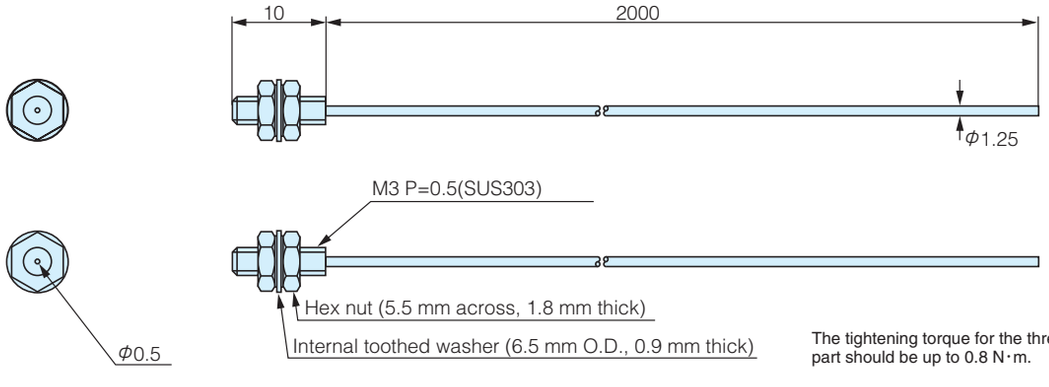


Detecting distances for individual amplifier models (mm)



Model	**FT8BC**	M3 screw, long-distance detection with small diameter	Search ID No.	4
Detection method	Through-beam			

CAD

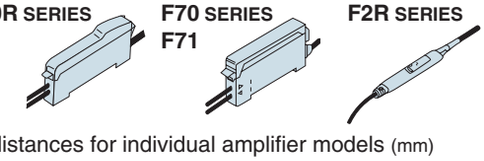


The tightening torque for the threaded part should be up to 0.8 N·m.

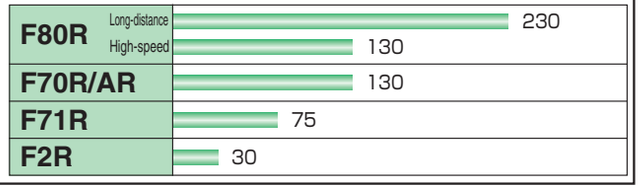
Model		**FT8BC**
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.5
Allowable bending radius		R15
Standard detection object diameter		φ0.5
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

F80R SERIES **F70 SERIES** **F71** **F2R SERIES**



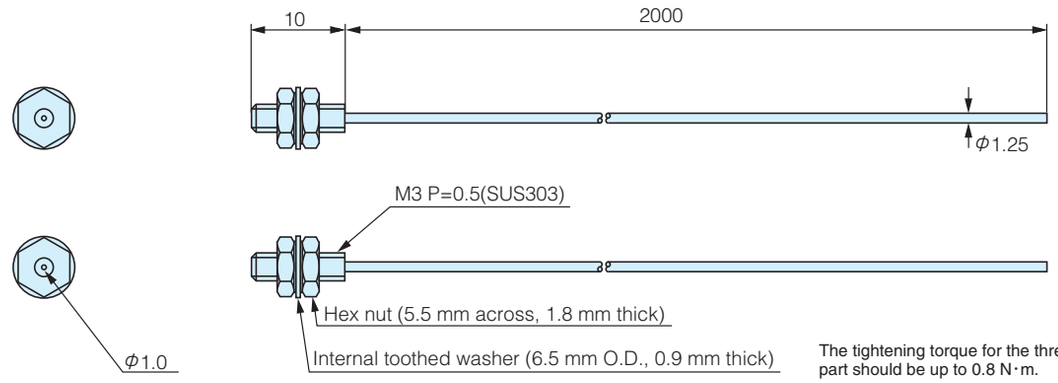
Detecting distances for individual amplifier models (mm)



Fiber Optic Cables

Model	FT108BC	M3 screw, generic type	Search ID No.	5
Detection method	Through-beam			

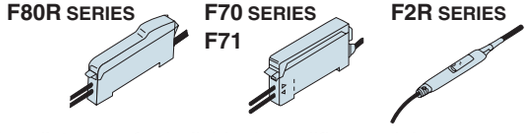
CAD



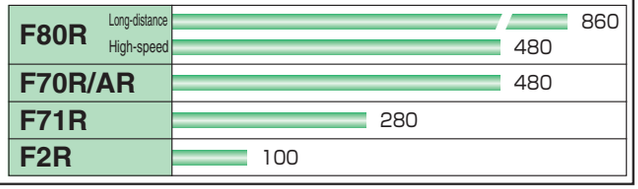
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FT108BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	1.0
Allowable bending radius		R30
Standard detection object diameter		φ1
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

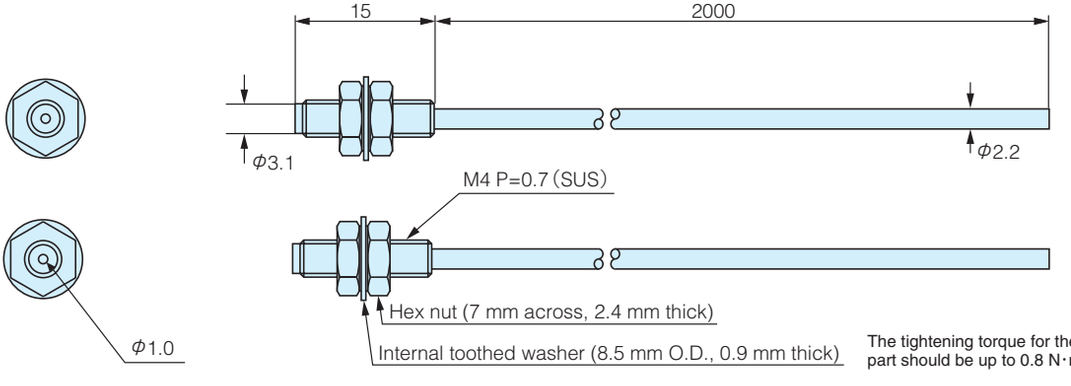


Detecting distances for individual amplifier models (mm)



Model	FT5BC	M4 screw, generic φ2.2 fiber optic cable	Search ID No.	6
Detection method	Through-beam			

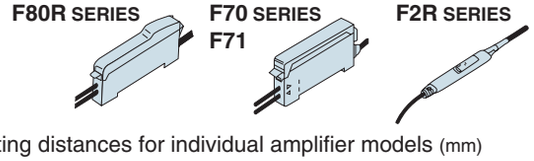
CAD



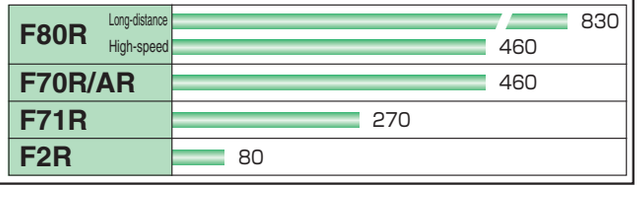
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FT5BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0
Allowable bending radius		R30
Standard detection object diameter		φ1
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

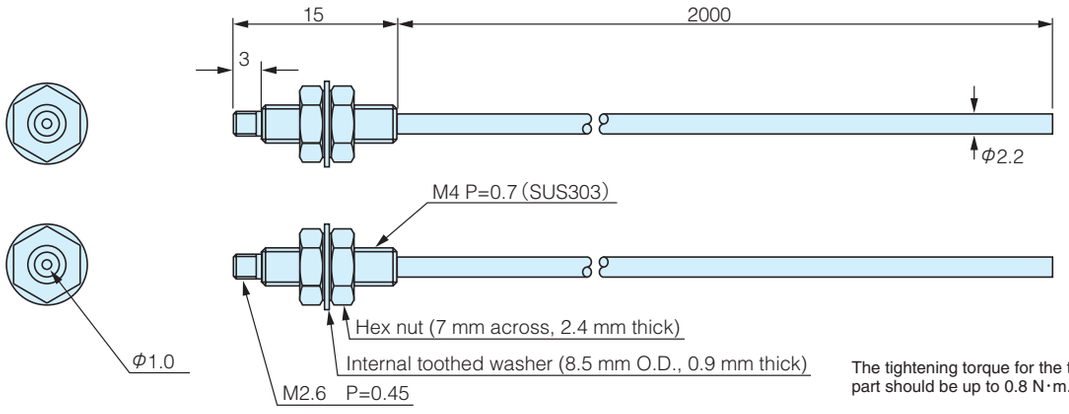


Detecting distances for individual amplifier models (mm)



Model	FT7BC	Two-tiered M4 screw with M2.6 tip	Search ID No.	7
Detection method	Through-beam			

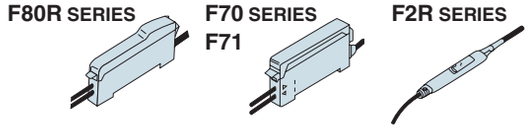
CAD



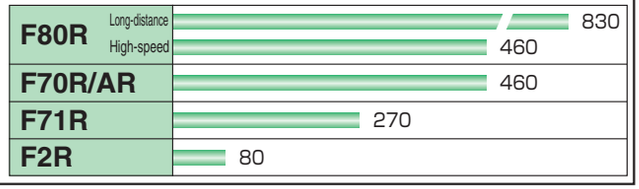
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FT7BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0
Allowable bending radius		R30
Standard detection object diameter		ϕ1
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier

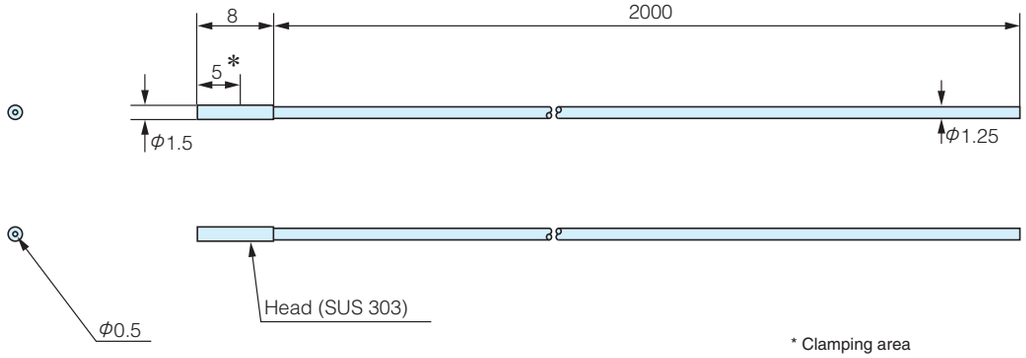


Detecting distances for individual amplifier models (mm)



Model	FT81BC	ϕ1.5 unthreaded	Search ID No.	8
Detection method	Through-beam			

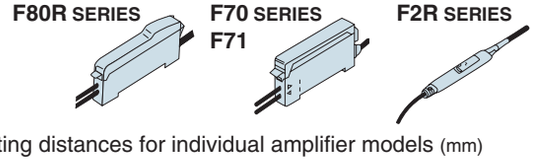
CAD



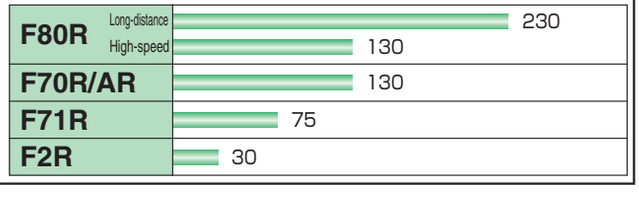
* Clamping area

Model		FT81BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.5
Allowable bending radius		R15
Standard detection object diameter		ϕ0.5
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier



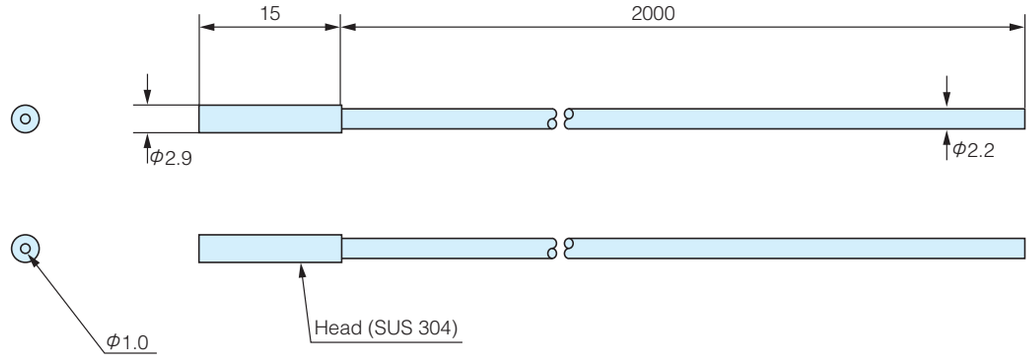
Detecting distances for individual amplifier models (mm)



Fiber Optic Cables

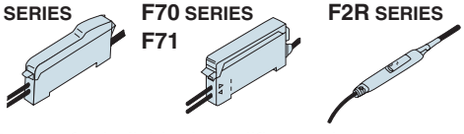
Model	FT3BC	Longest distance achievable with ϕ2.9 unthreaded type	Search ID No. 9
Detection method	Through-beam		

CAD

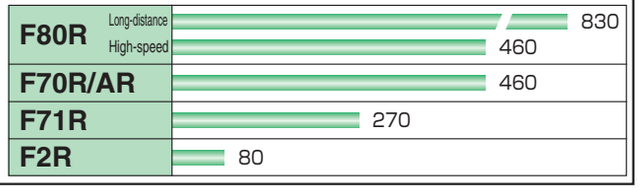


Model		FT3BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0
Allowable bending radius		R30
Standard detection object diameter		ϕ1
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier

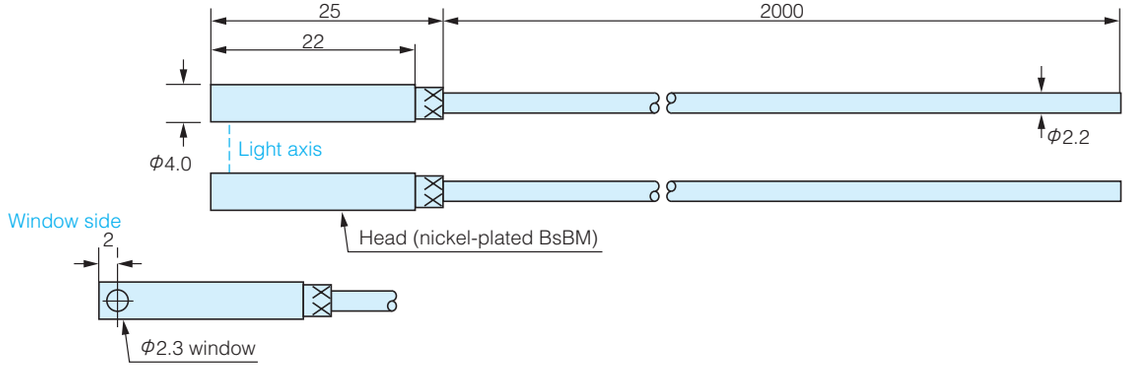


Detecting distances for individual amplifier models (mm)



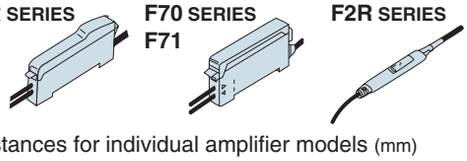
Model	FTV74BC	Side-view, ϕ4 unthreaded with ϕ2.3 window	Search ID No. 10
Detection method	Through-beam		

CAD

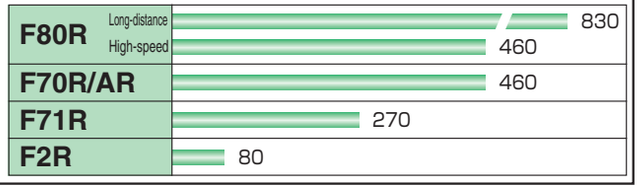


Model		FTV74BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0
Allowable bending radius		R30
Standard detection object diameter		ϕ2
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier

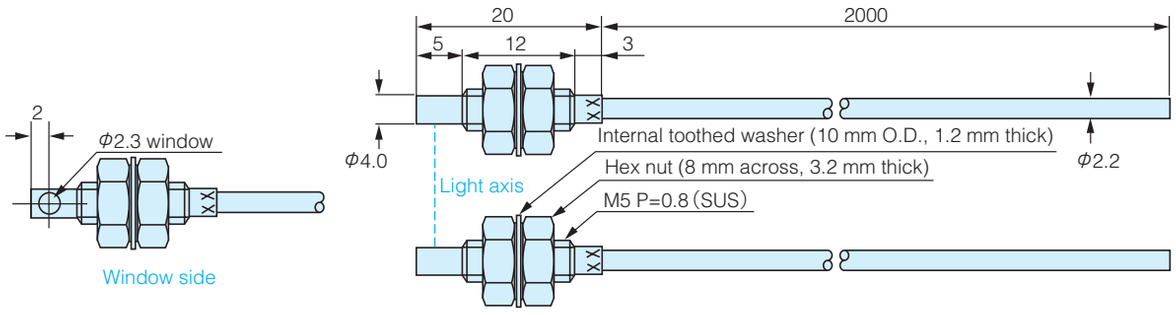


Detecting distances for individual amplifier models (mm)



Model	FTV7BC	φ4 head side-view with φ2.3 window and M5 screw	Search ID No. 11
Detection method	Through-beam		

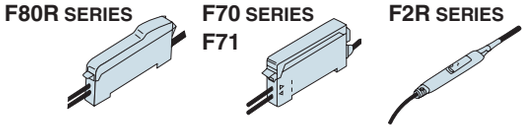
CAD



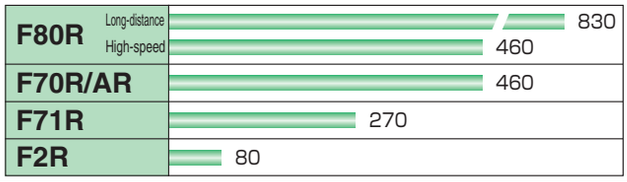
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FTV7BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0
Allowable bending radius		R30
Standard detection object diameter		φ2
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

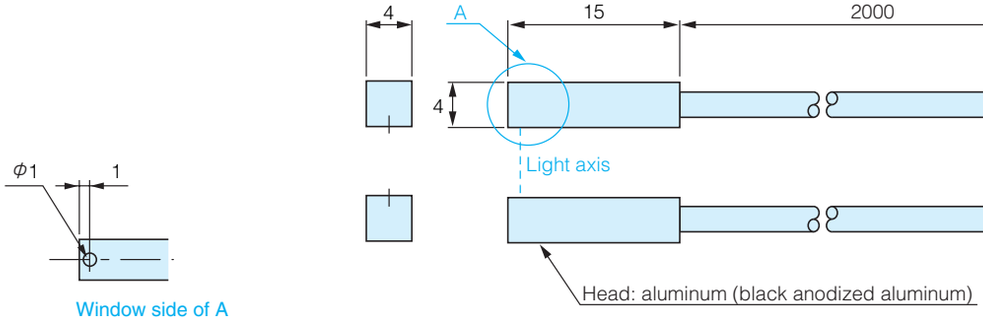


Detecting distances for individual amplifier models (mm)



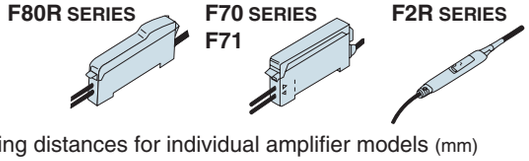
Model	FTV502YBC	4-mm square head, allowable bending radius 1 mm	Search ID No. 12
Detection method	Through-beam		

CAD

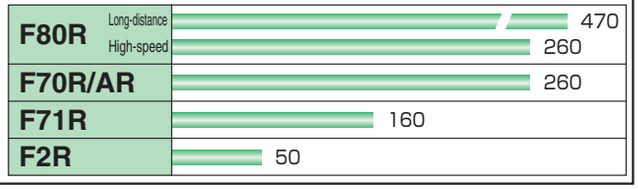


Model		FTV502YBC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0 (multi-core)
Allowable bending radius		R1
Standard detection object diameter		φ1
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier



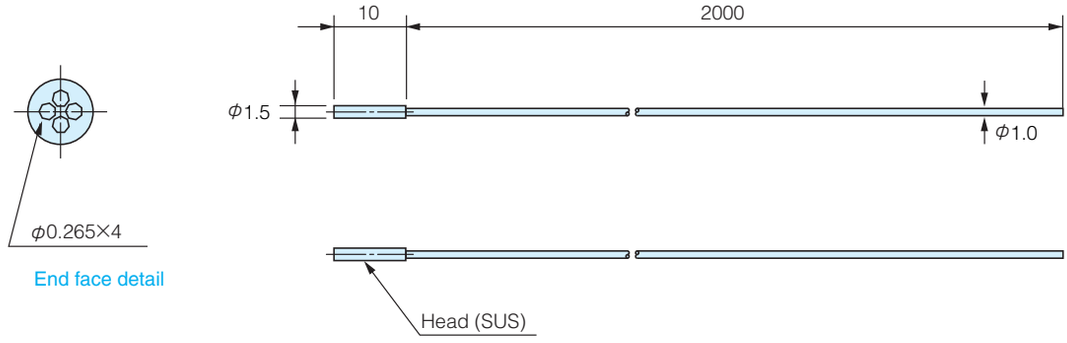
Detecting distances for individual amplifier models (mm)



Fiber Optic Cables

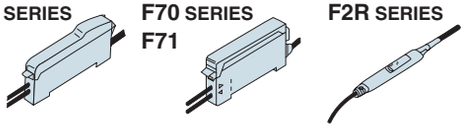
Model	FT91YBC	ϕ1.5 unthreaded, allowable bending radius 4 mm	Search ID No.	13
Detection method	Through-beam			

CAD

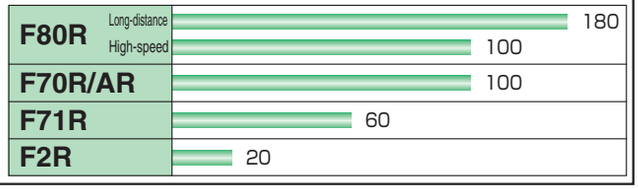


Model		FT91YBC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.0
	Core	0.265 x 4
Allowable bending radius		R4
Standard detection object diameter		ϕ0.5
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier

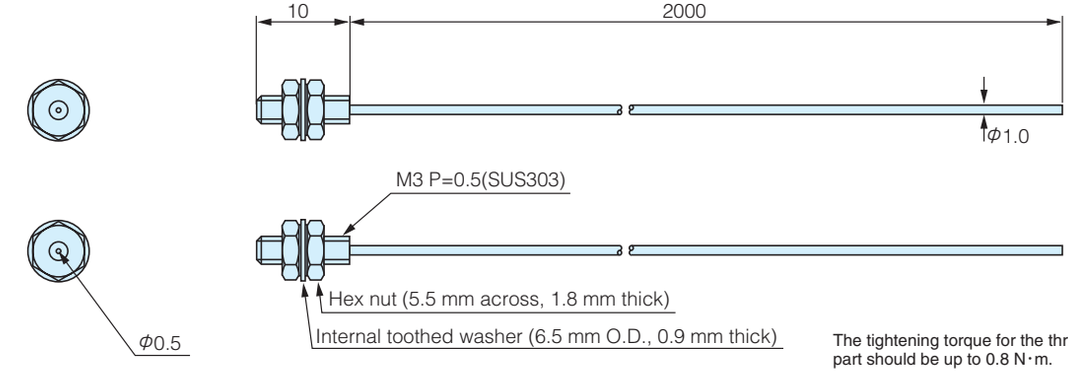


Detecting distances for individual amplifier models (mm)



Model	FT19YBC	M3 screw short head, allowable minimum bending radius 1.0 mm	Search ID No.	14
Detection method	Through-beam			

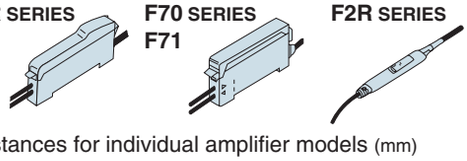
CAD



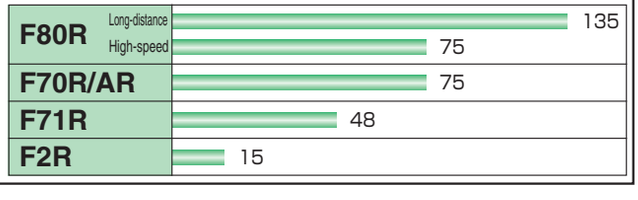
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FT19YBC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.0
	Core	0.5 (multi-core)
Allowable bending radius		R1
Standard detection object diameter		ϕ0.5
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier

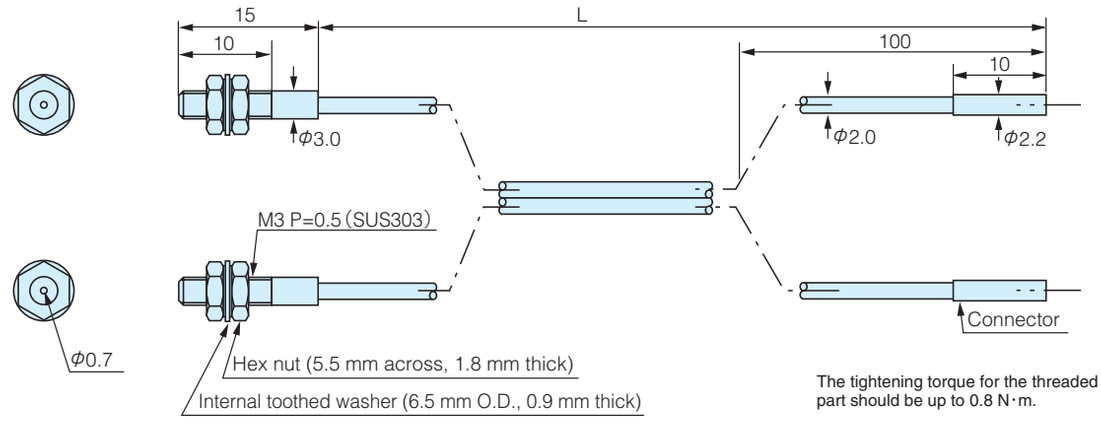


Detecting distances for individual amplifier models (mm)



Model	GTK Series	M3 screw, glass fiber achieving allowable bending radius 3.5 mm	Search ID No. 15
Detection method	Through-beam		

CAD

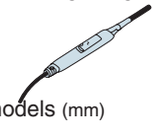


The tightening torque for the threaded part should be up to 0.8 N·m.

Model		GTK905	GTK910
Fiber optic cable length(m)		0.5	1
Ambient temperature		– 30 ~ + 70 ºC	
Material	Covering	Vinyl chloride	
	Core	Glass	
Diameter	Cable	2.0	
	Core	Binding diameter: 0.7 mm	
Allowable bending radius		R3.5	
Standard detection object diameter		φ0.7	
Smallest allowable detection object diameter		φ0.05	

Applicable amplifier

F2R SERIES

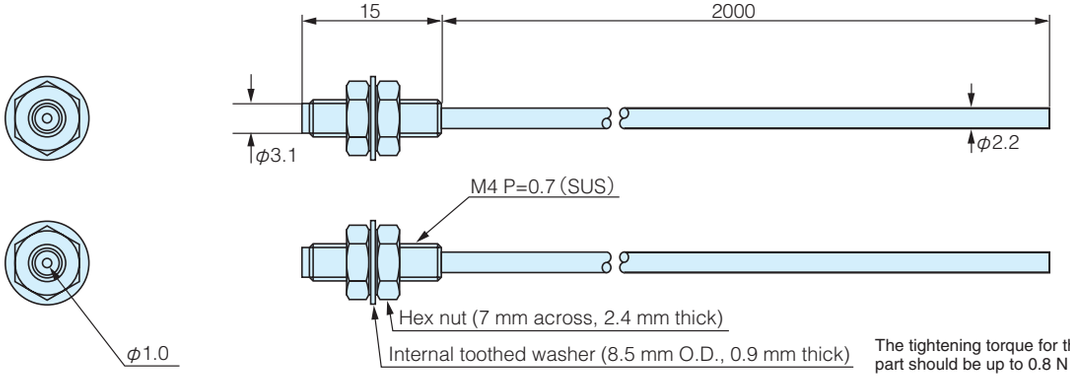


Detecting distances for individual amplifier models (mm)

F2R		60

Model	FT5YBC	M4 screw, allowable minimum bending radius 1.0 mm	Search ID No. 16
Detection method	Through-beam		

CAD

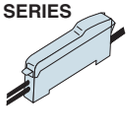


The tightening torque for the threaded part should be up to 0.8 N·m.

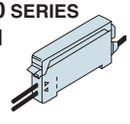
Model		FT5YBC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0 (multi-core)
Allowable bending radius		R1
Standard detection object diameter		φ1
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

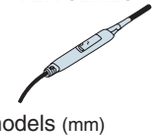
F80R SERIES



F70 SERIES
F71



F2R SERIES



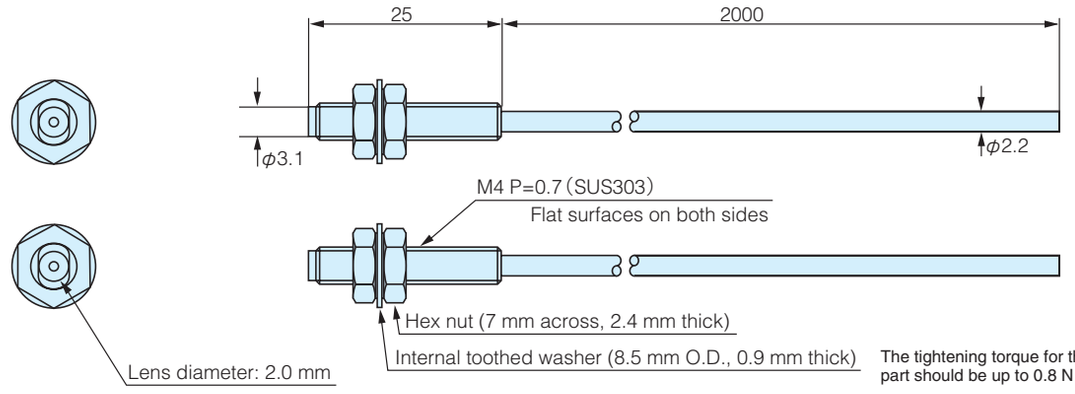
Detecting distances for individual amplifier models (mm)

F80R	Long-distance	700
	High-speed	380
F70R/AR		380
F71R		230
F2R		70

Fiber Optic Cables

Model	FTN5BC	M4 screw, lens-integrated	Search ID No.	17
Detection method	Through-beam			

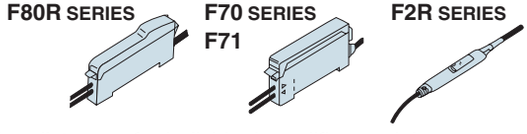
CAD



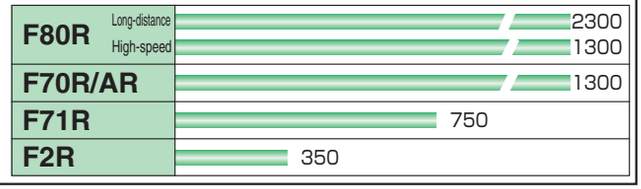
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FTN5BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	0.5
Allowable bending radius		R30
Standard detection object diameter		φ0.5
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

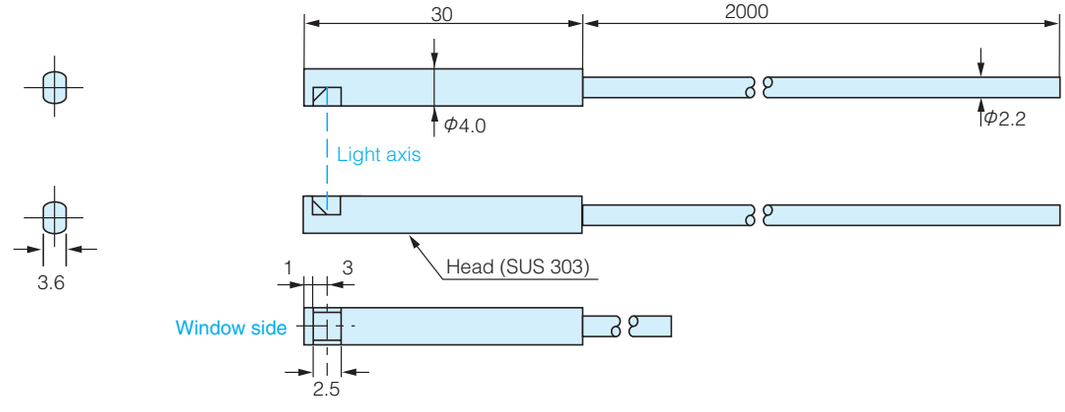


Detecting distances for individual amplifier models (mm)



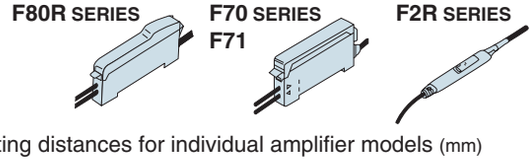
Model	FTVN5BC	φ4 unthreaded side-view	Search ID No.	18
Detection method	Through-beam			

CAD

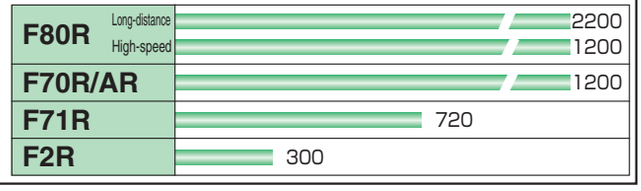


Model		FTVN5BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	0.5
Allowable bending radius		R30
Standard detection object diameter		φ0.5
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

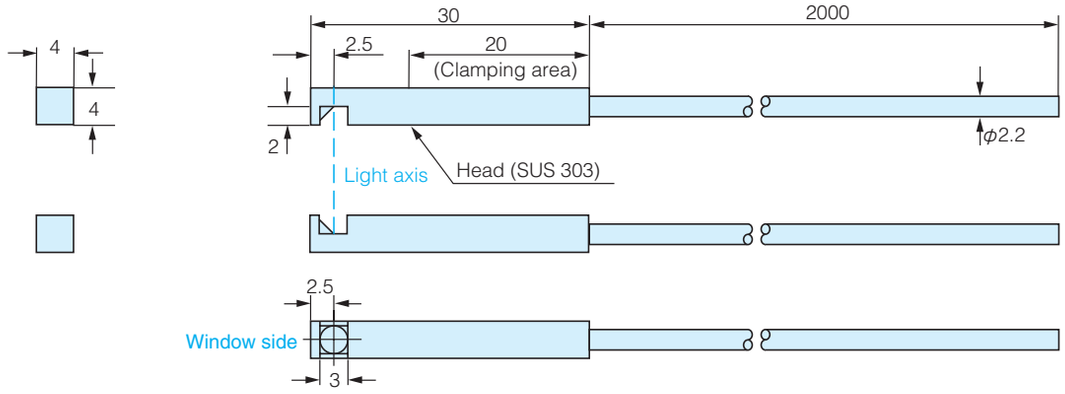


Detecting distances for individual amplifier models (mm)



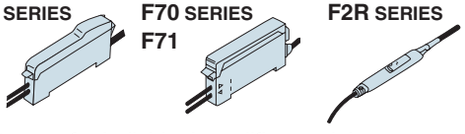
Model	FTVN501BC	4-mm□ side-view allowing simple light axis alignment	Search ID No.	19
Detection method	Through-beam			

CAD

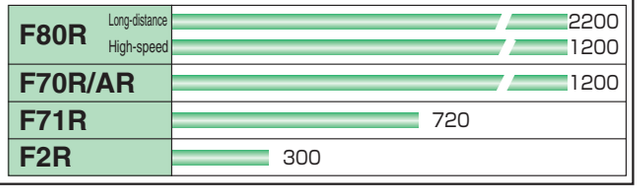


Model		FTVN501BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	0.5
Allowable bending radius		R30
Standard detection object diameter		ϕ0.5
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier

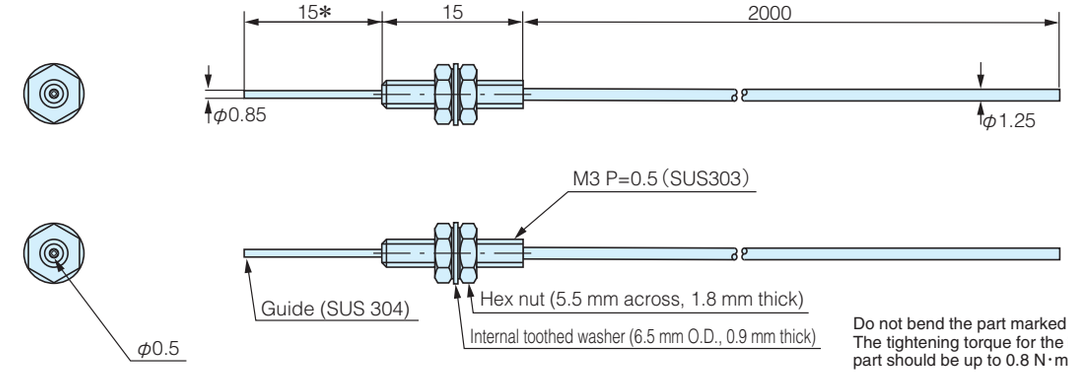


Detecting distances for individual amplifier models (mm)



Model	FTS88BC	15 mm SUS tube with M3 screw	Search ID No.	20
Detection method	Through-beam			

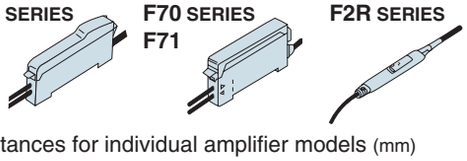
CAD



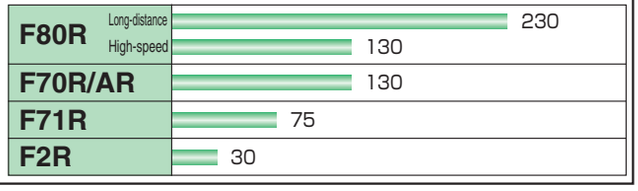
Do not bend the part marked with *.
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FTS88BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.5
Allowable bending radius		R15
Standard detection object diameter		ϕ0.5
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier



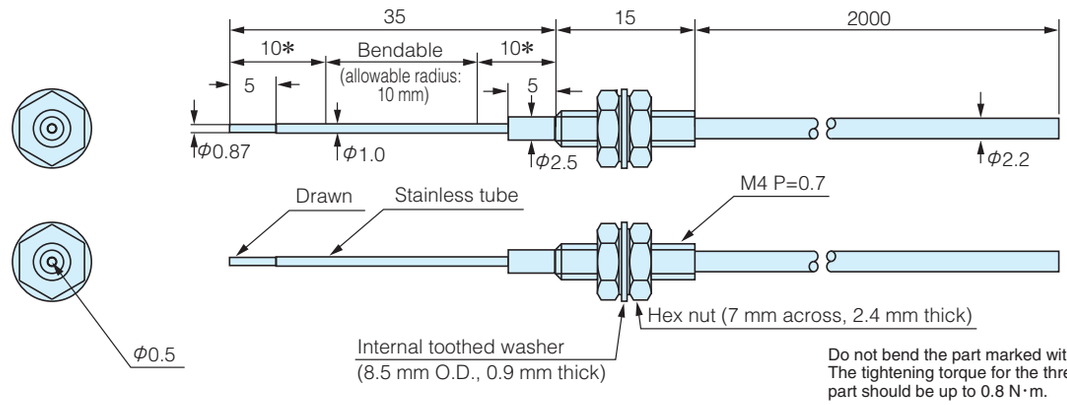
Detecting distances for individual amplifier models (mm)



Fiber Optic Cables

Model	FTS53BC	35 mm SUS tube with M4 screw	Search ID No. 21
Detection method	Through-beam		

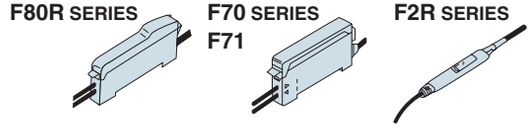
CAD



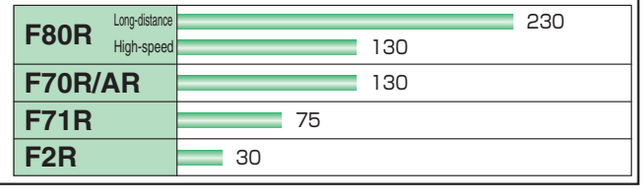
Do not bend the part marked with *. The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FTS53BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	0.5
Allowable bending radius		SUS part: 10 mm / Fiber optic cable: 15 mm
Standard detection object diameter		φ0.5
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

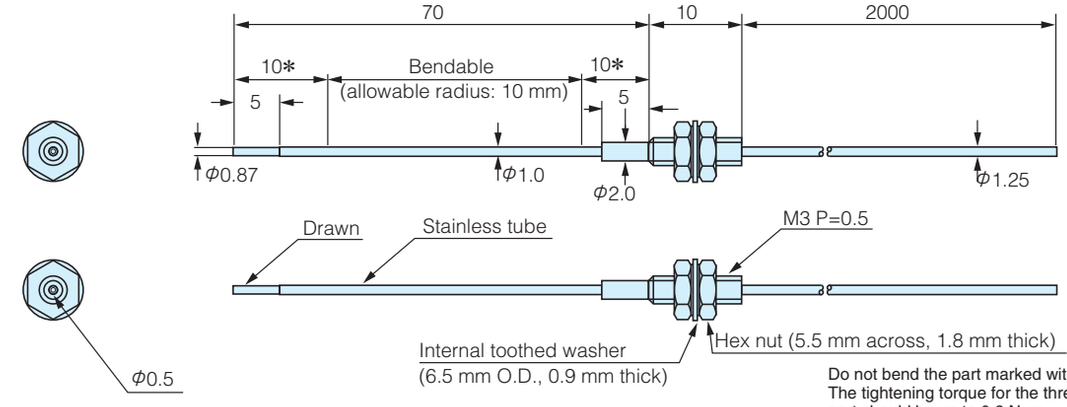


Detecting distances for individual amplifier models (mm)



Model	FTS8BC	φ1.25 fiber optic cable with 70 mm SUS tube	Search ID No. 22
Detection method	Through-beam		

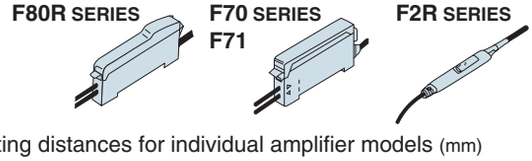
CAD



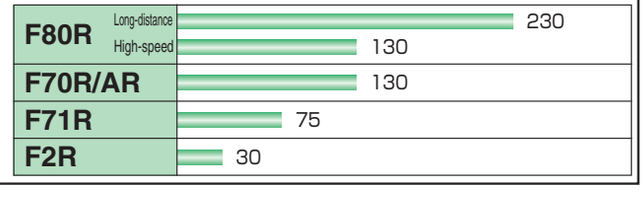
Do not bend the part marked with *. The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FTS8BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.5
Allowable bending radius		SUS part: 10 mm / Fiber optic cable: 15 mm
Standard detection object diameter		φ0.5
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

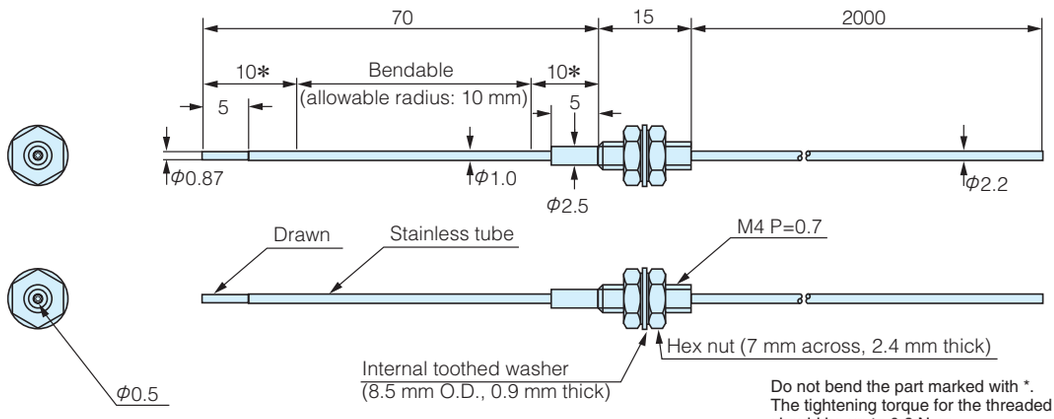


Detecting distances for individual amplifier models (mm)



Model	FTS5BC	70 mm SUS tube with M4 screw	Search ID No.	23
Detection method	Through-beam			

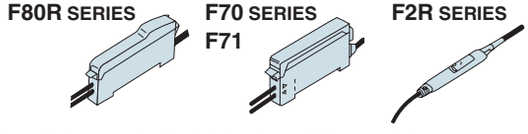
CAD



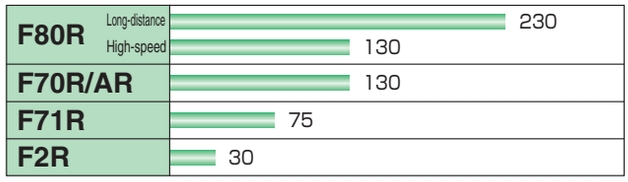
Do not bend the part marked with *.
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FTS5BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	0.5
Allowable bending radius		SUS part: 10 mm / Fiber optic cable: 15 mm
Standard detection object diameter		φ0.5
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

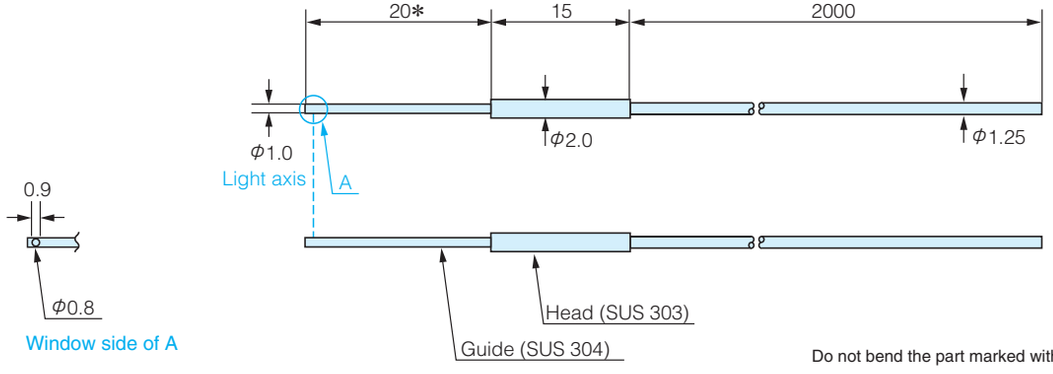


Detecting distances for individual amplifier models (mm)



Model	FTSV82BC	φ1 head 20 mm SUS side-view with φ0.8 window	Search ID No.	24
Detection method	Through-beam			

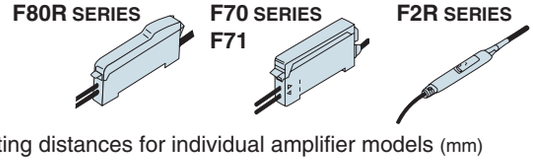
CAD



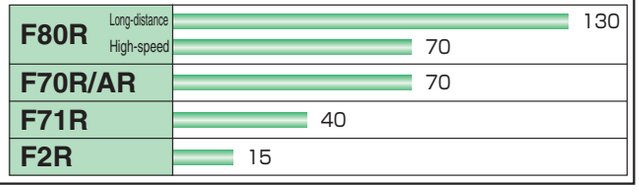
Do not bend the part marked with *

Model		FTSV82BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.5
Allowable bending radius		R15
Standard detection object diameter		φ0.5
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier



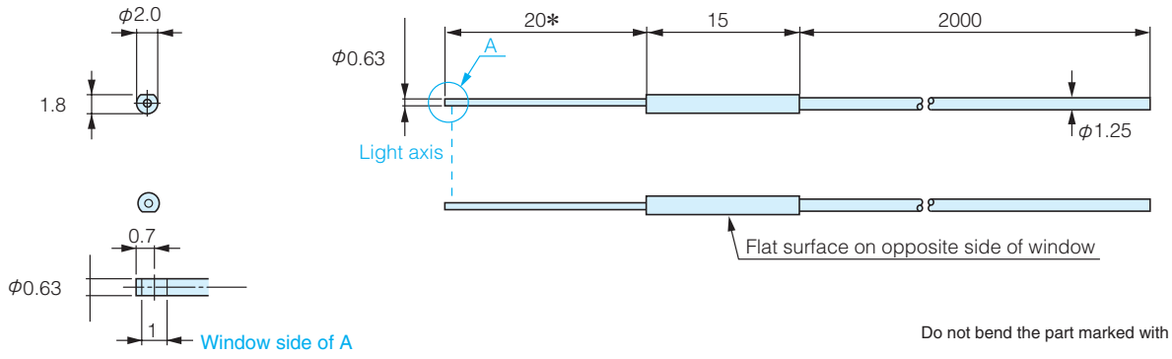
Detecting distances for individual amplifier models (mm)



Fiber Optic Cables

Model	FTSV821BC	ϕ2 unthreaded SUS 20 mm	Search ID No.	25
Detection method	Through-beam			

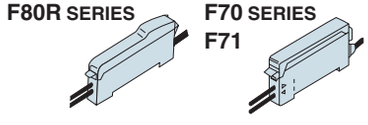
CAD



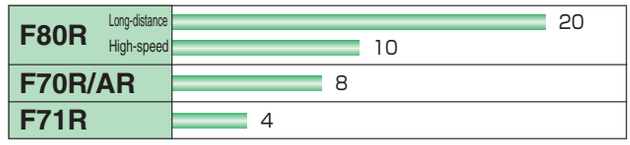
Do not bend the part marked with *

Model		FTSV821BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.25
Allowable bending radius		R15
Standard detection object diameter		ϕ0.25
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier



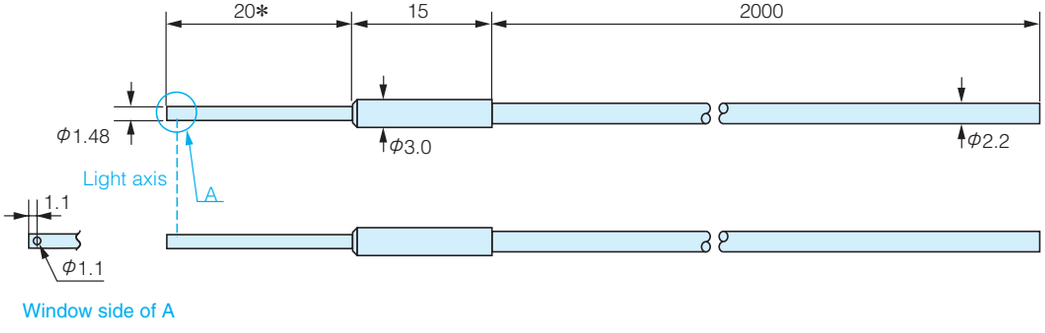
Detecting distances for individual amplifier models (mm)



Model	Search ID No.	26
FTSV73BC	ϕ1.48 head 20 mm SUS tube side-view with ϕ1.1 window	
Through-beam		

Detection method

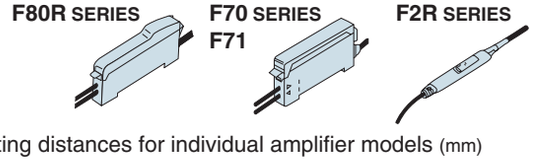
CAD



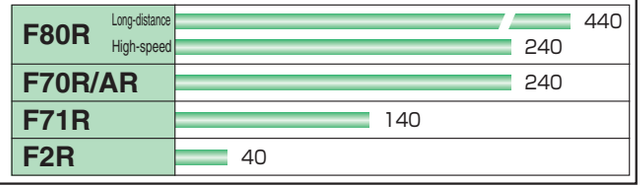
Do not bend the part marked with *

Model		FTSV73BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0
Allowable bending radius		R30
Standard detection object diameter		ϕ1
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier

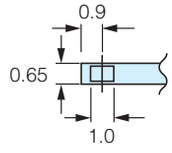


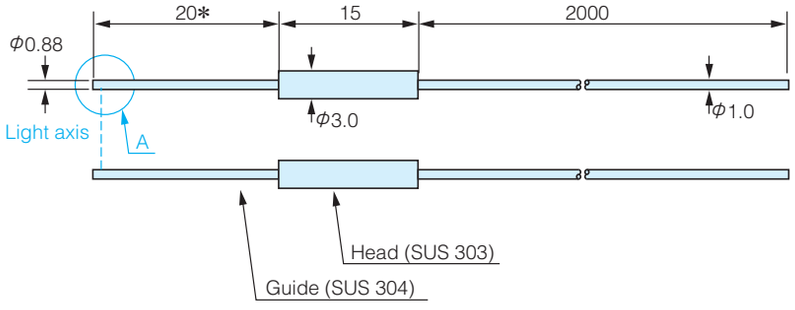
Detecting distances for individual amplifier models (mm)



Model	FTSV93BC	ϕ0.88 head 20 mm SUS, allowable bending radius 4 mm	Search ID No. 27
Detection method	Through-beam		

CAD

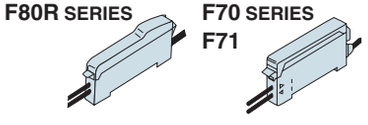




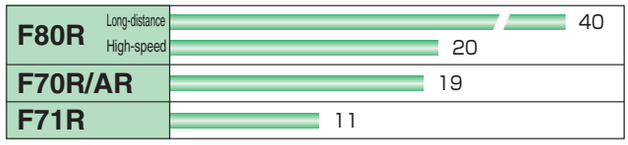
Do not bend the part marked with *.

Model		FTSV93BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.0
	Core	0.25 x 3
Allowable bending radius		R4
Standard detection object diameter		ϕ0.5
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier

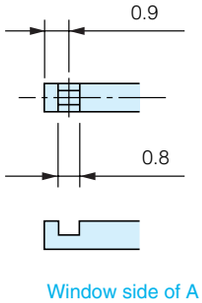


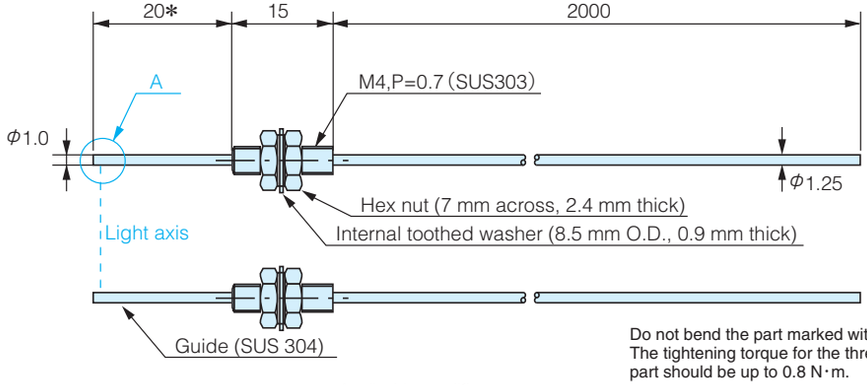
Detecting distances for individual amplifier models (mm)



Model	FTSV84BC	M4 screw SUS 20 mm	Search ID No. 28
Detection method	Through-beam		

CAD

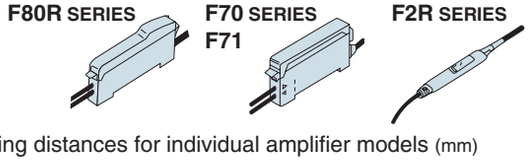




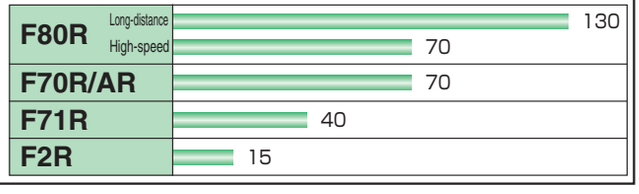
Do not bend the part marked with *.
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FTSV84BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.5
Allowable bending radius		R15
Standard detection object diameter		ϕ0.5
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier



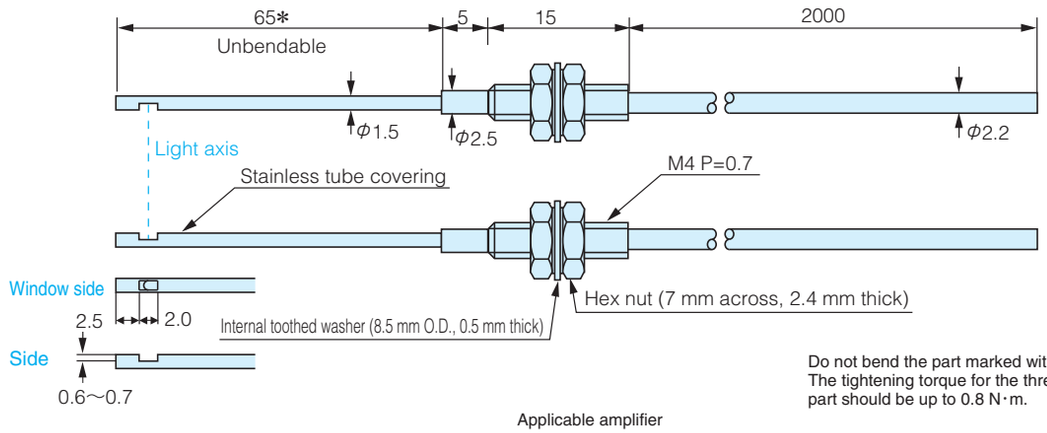
Detecting distances for individual amplifier models (mm)



Fiber Optic Cables

Model	FTSV5BC	Side-view 65 mm SUS tube with M4 screw	Search ID No.	29
Detection method	Through-beam			

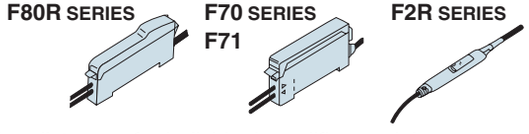
CAD



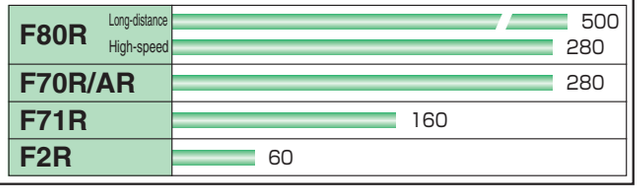
Do not bend the part marked with *.
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FTSV5BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0
Allowable bending radius		R30
Standard detection object diameter		ϕ1
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier

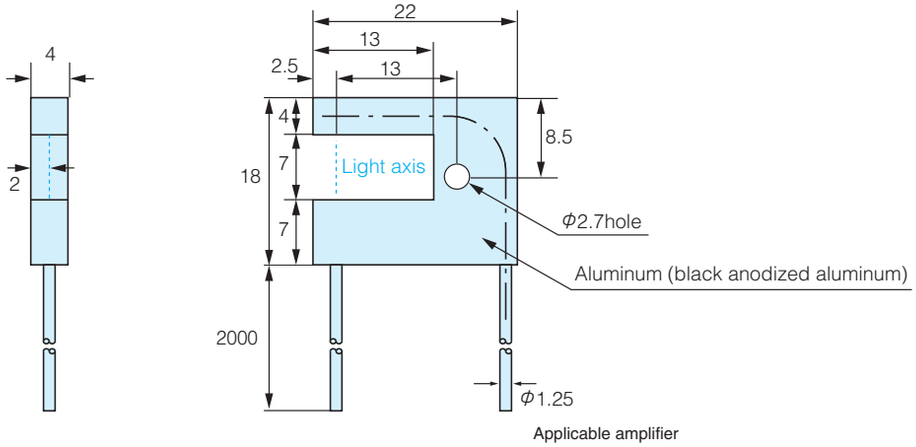


Detecting distances for individual amplifier models (mm)



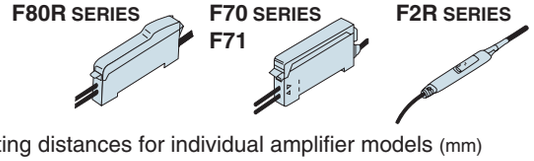
Model	FU505BC	U-shaped side-on head with fixed 7-mm detecting distance	Search ID No.	30
Detection method	Through-beam			

CAD



Model		FU505BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.5
Allowable bending radius		R15
Standard detection object diameter		ϕ1
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

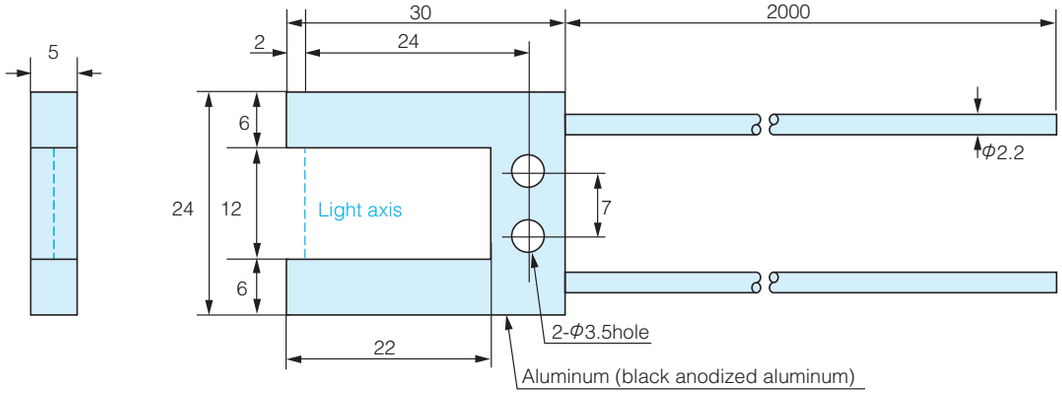
Applicable amplifier



Detecting distances for individual amplifier models (mm)

Model	**FU712BC**	No light axis alignment required with U-shaped head with fixed 12-mm detecting distance	Search ID No.	**31**
Detection method	Through-beam			

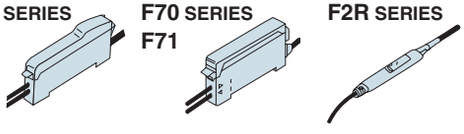
CAD



Model		**FU712BC**
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0
Allowable bending radius		R30
Standard detection object diameter		φ1
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

F80R SERIES **F70 SERIES** **F71** **F2R SERIES**

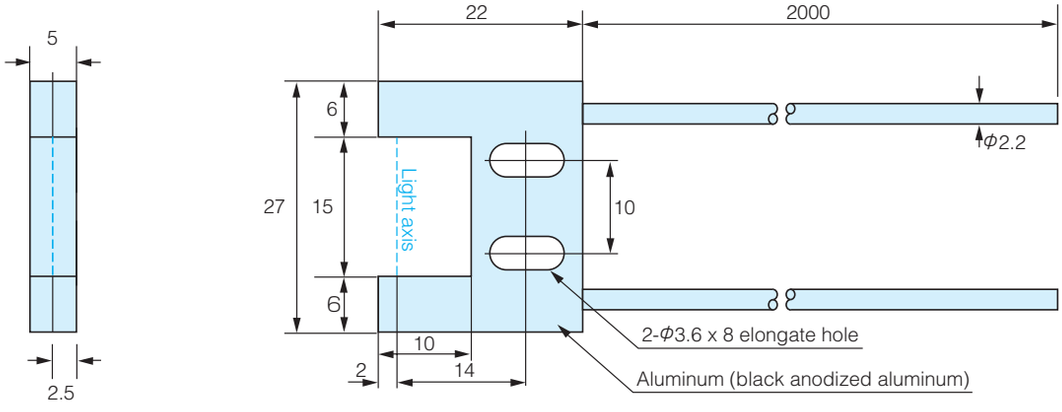


Detecting distances for individual amplifier models (mm)

F80R	Long-distance	12
	High-speed	12
F70R/AR		12
F71R		12
F2R		12

Model	**FU715BC**	U-shaped head with fixed 15-mm detecting distance	Search ID No.	**32**
Detection method	Through-beam			

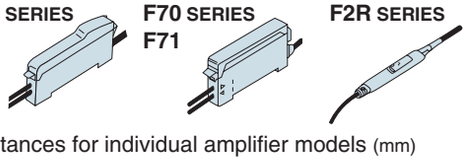
CAD



Model		**FU715BC**
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0
Allowable bending radius		R30
Standard detection object diameter		φ1
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

F80R SERIES **F70 SERIES** **F71** **F2R SERIES**



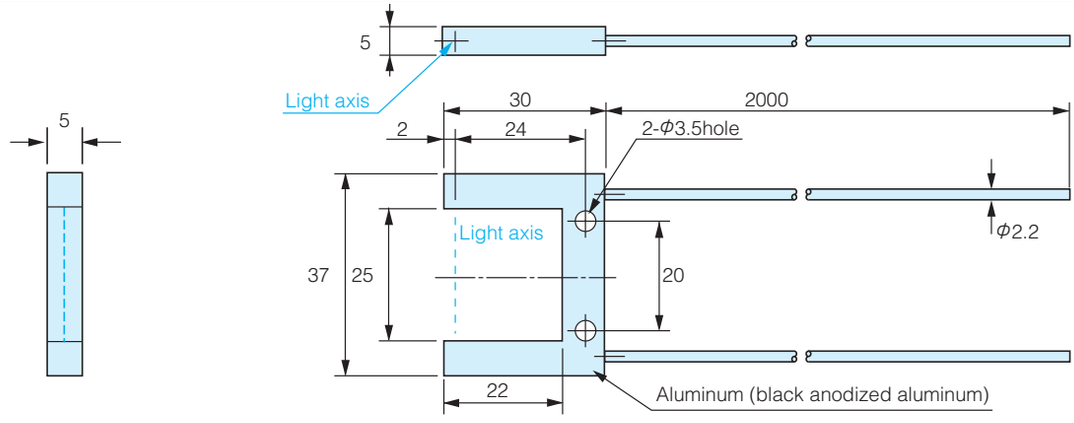
Detecting distances for individual amplifier models (mm)

F80R	Long-distance	15
	High-speed	15
F70R/AR		15
F71R		15
F2R		15

Fiber Optic Cables

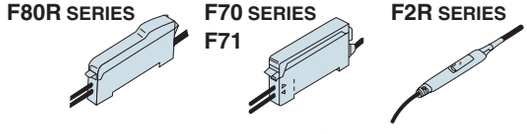
MODEL	FU725BC	No light axis alignment required, vibration-resistant	Search ID No.	33
Detection method	Through-beam			

CAD



Model		FU725BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0
Allowable bending radius		R30
Standard detection object diameter		φ1
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

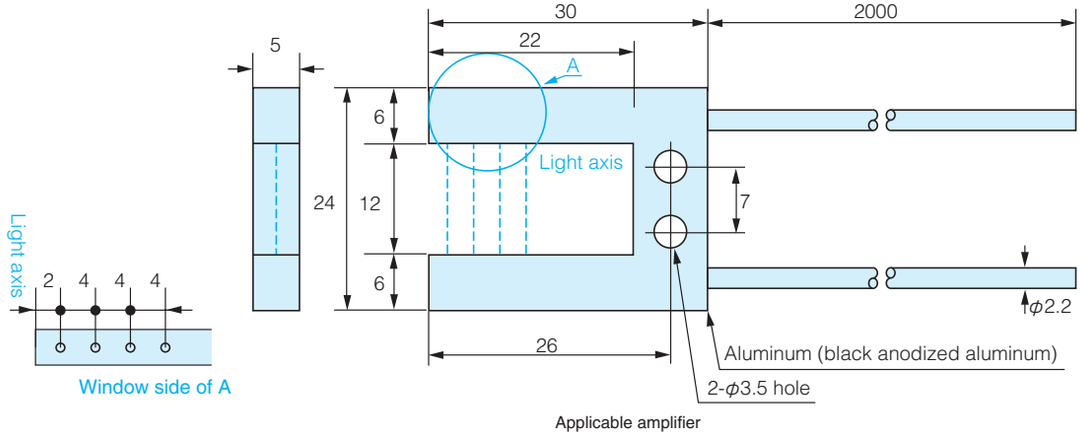


Detecting distances for individual amplifier models (mm)

F80R	Long-distance	25
	High-speed	25
F70R/AR		25
F71R		25
F2R		25

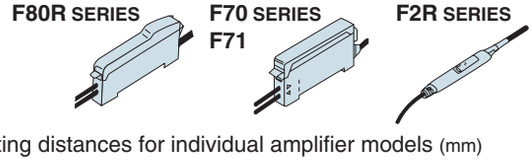
MODEL	FU904BC	4-light-axis model	Search ID No.	34
Detection method	Through-beam			

CAD



Model		FU904BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyvinyl chloride
	Core	Plastic
Diameter	Cable	2.2
	Core	0.265 x 16
Allowable bending radius		R30
Standard detection object diameter		–
Smallest allowable detection object diameter		–

Applicable amplifier

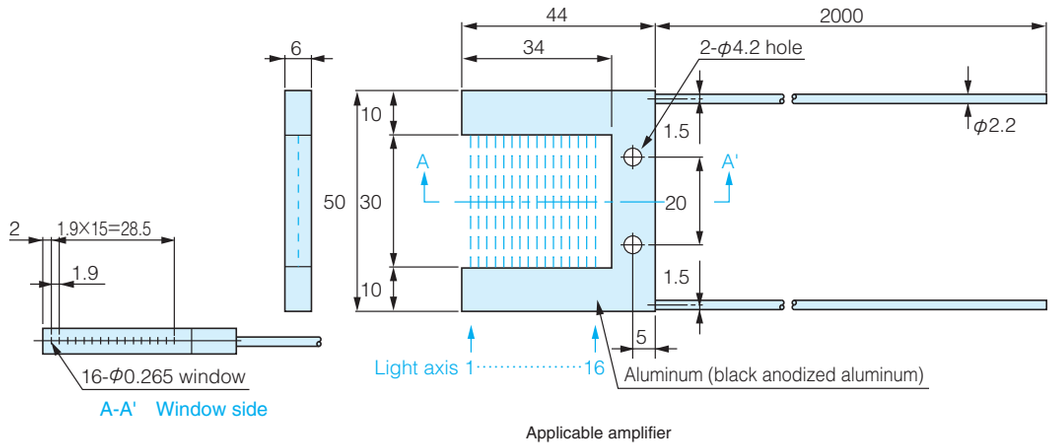


Detecting distances for individual amplifier models (mm)

F80R	Long-distance	12
	High-speed	12
F70R/AR		12
F71R		12
F2R		12

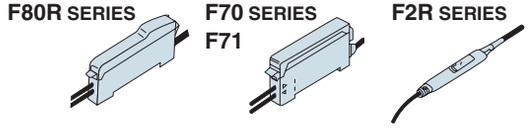
MODEL	FU916BC	No light axis alignment required, 16 light axes	Search ID No.	35
Detection method	Through-beam			

CAD



Model		FU916BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyvinyl chloride
	Core	Plastic
Diameter	Cable	2.2
	Core	0.265 x 16
Allowable bending radius		R30
Standard detection object diameter		–
Smallest allowable detection object diameter		–

Applicable amplifier

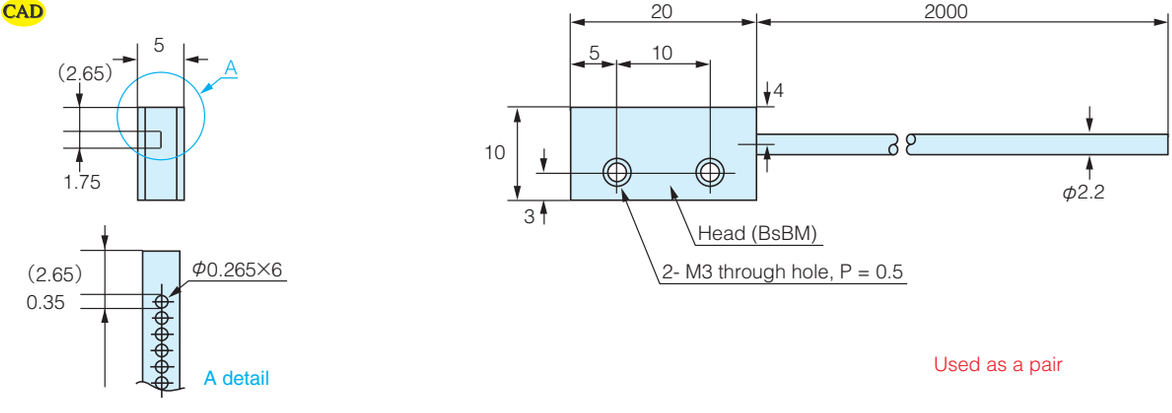


Detecting distances for individual amplifier models (mm)

F80R	Long-distance	30
	High-speed	30
F70R/AR		30
F71R		30
F2R		30

MODEL	FTL706BC	Wide-area model with 1.75 mm detecting width	Search ID No.	36
Detection method	Through-beam			

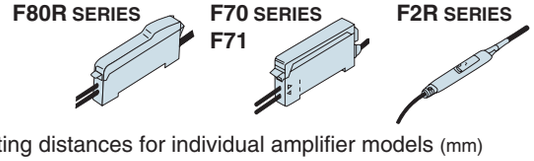
CAD



Used as a pair

Model		FTL706BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	0.265 x 6
Allowable bending radius		R30
Standard detection object diameter		φ1
Smallest allowable detection object diameter		φ0.05 (excluding F71R, F2R)

Applicable amplifier



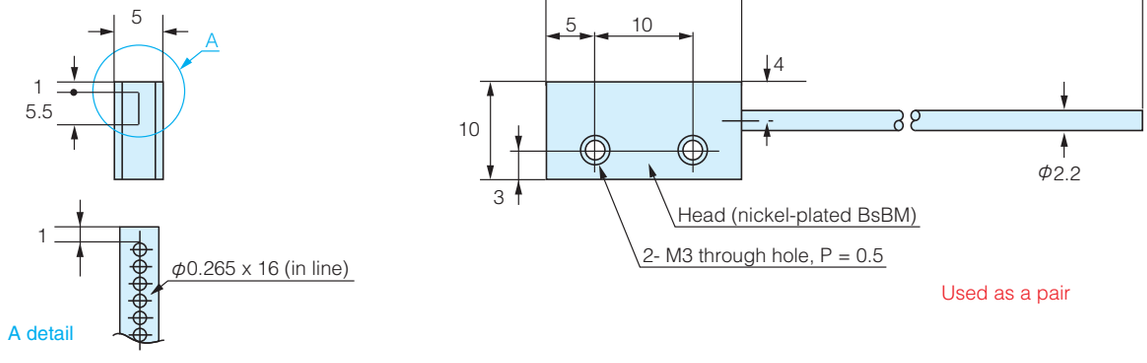
Detecting distances for individual amplifier models (mm)

F80R	Long-distance	300
	High-speed	170
F70R/AR		170
F71R		95
F2R		30

Fiber Optic Cables

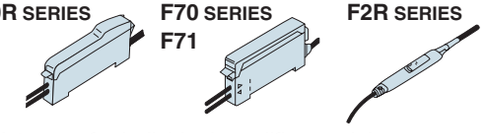
MODEL	FTL716BC	Wide-area head-on model with 5.5-mm detecting width	Search ID No.	37
Detection method	Through-beam			

CAD

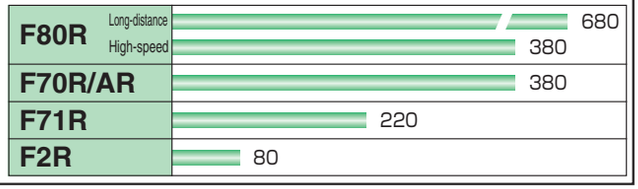


Model		FTL716BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	0.265 x 16
Allowable bending radius		R30
Standard detection object diameter		φ1
Smallest allowable detection object diameter		φ0.05 (excluding F71R, F2R)

Applicable amplifier

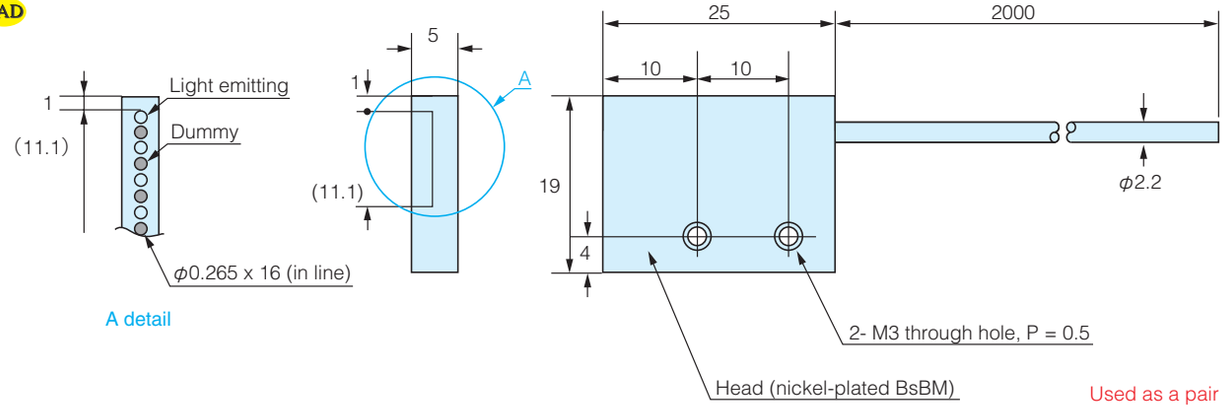


Detecting distances for individual amplifier models (mm)



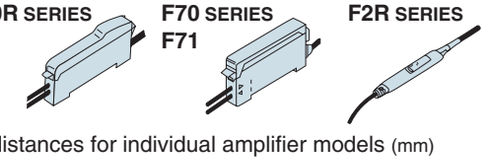
MODEL	FTL7165BC	Wide-area model with 11.1-mm detecting width	Search ID No.	38
Detection method	Through-beam			

CAD

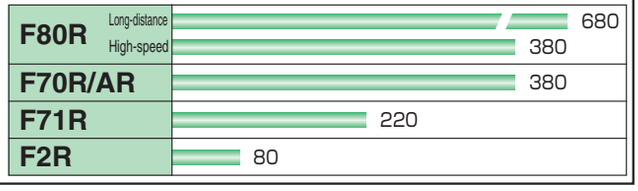


Model		FTL7165BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	0.265 x 16
Allowable bending radius		R30
Standard detection object diameter		–
Smallest allowable detection object diameter		φ0.15 (excluding F71R, F2R)

Applicable amplifier

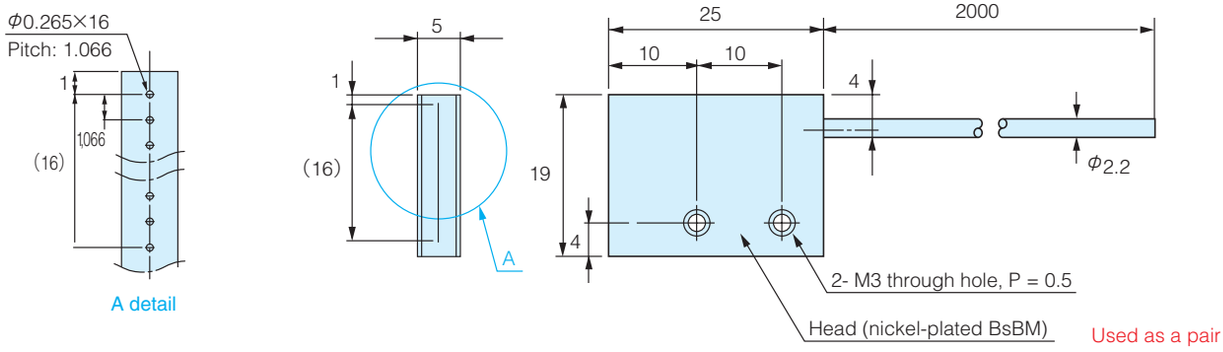


Detecting distances for individual amplifier models (mm)



MODEL	FTL7166BC	Detecting distance 16 mm	Search ID No.	39
Detection method	Through-beam			

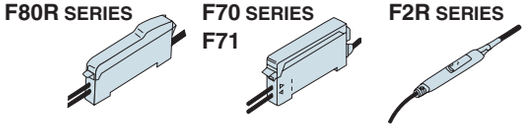
CAD



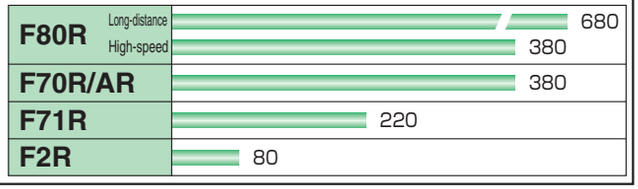
Used as a pair

Model		FTL7166BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	0.265 x 16
Allowable bending radius		R30
Standard detection object diameter		–
Smallest allowable detection object diameter		–

Applicable amplifier

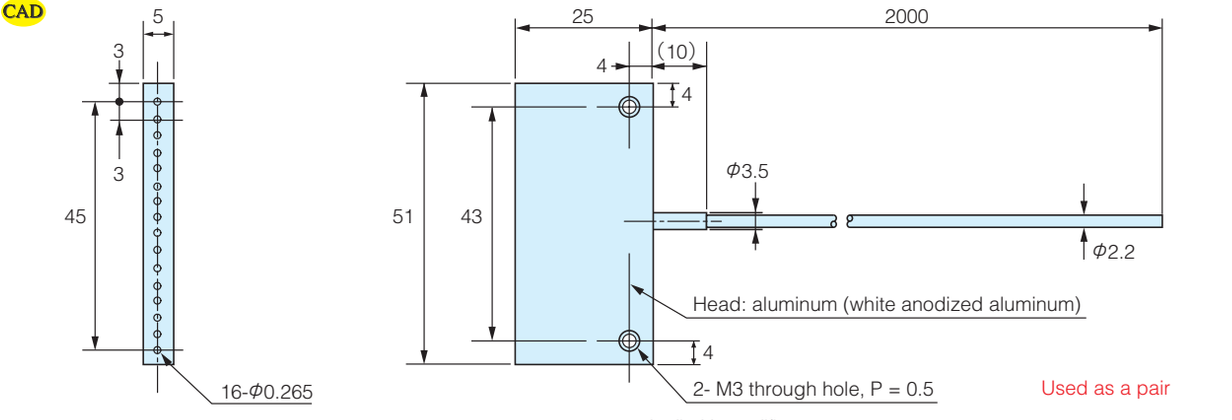


Detecting distances for individual amplifier models (mm)



MODEL	FTL745BC	Detecting distance 45 mm	Search ID No.	40
Detection method	Through-beam			

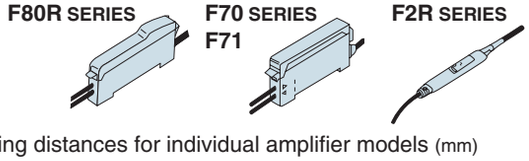
CAD



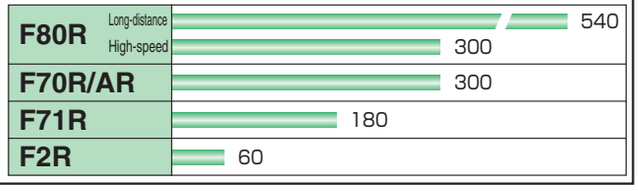
Used as a pair

Model		FTL745BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyvinyl chloride
	Core	Plastic
Diameter	Cable	2.2
	Core	0.265 x 16
Allowable bending radius		R30
Standard detection object diameter		–
Smallest allowable detection object diameter		–

Applicable amplifier



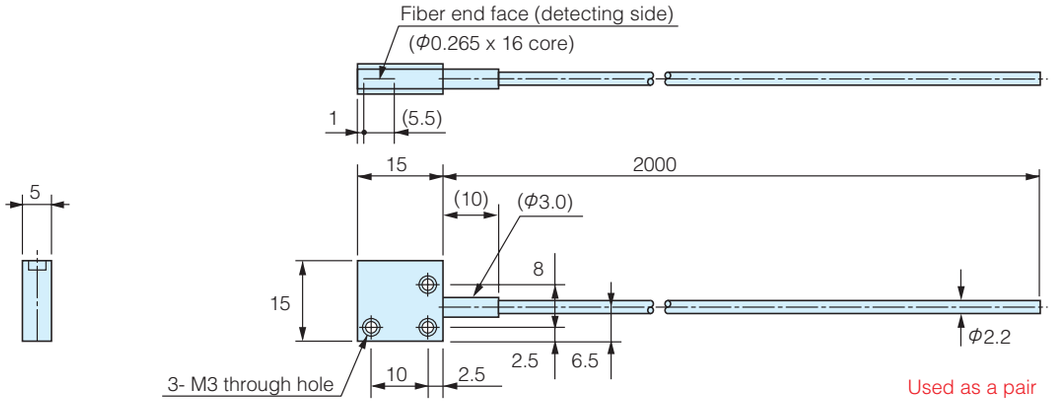
Detecting distances for individual amplifier models (mm)



Fiber Optic Cables

MODEL	FTLV702BC	Detecting distance 5.5 mm	Search ID No.	41
Detection method	Through-beam			

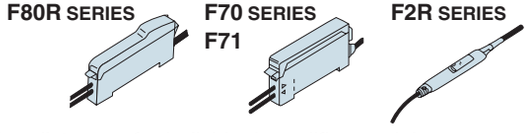
CAD



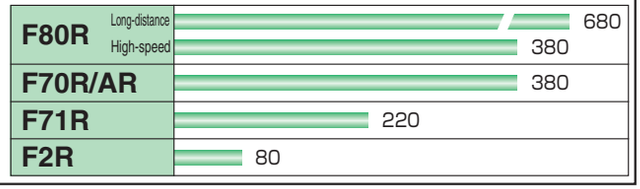
Used as a pair

Model		FTLV702BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	0.265 x 16
Allowable bending radius		R30
Standard detection object diameter		Φ1
Smallest allowable detection object diameter		Φ0.05 (excluding F71R, F2R)

Applicable amplifier

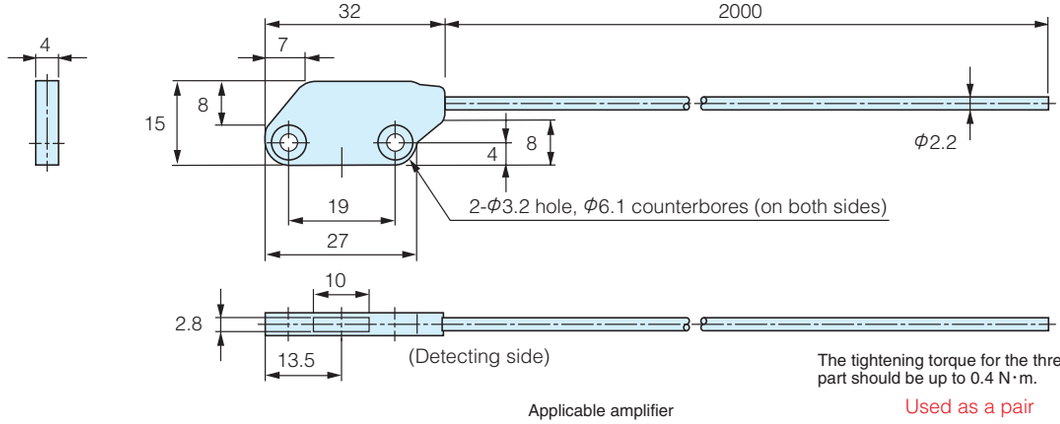


Detecting distances for individual amplifier models (mm)



MODEL	FTVW7YBC	Long-distance, wide-area model with 10-mm detecting width	Search ID No.	42
Detection method	Through-beam			

CAD

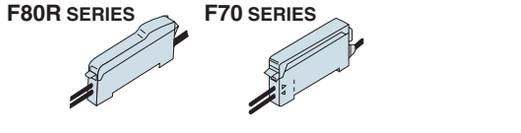


The tightening torque for the threaded part should be up to 0.4 N·m.

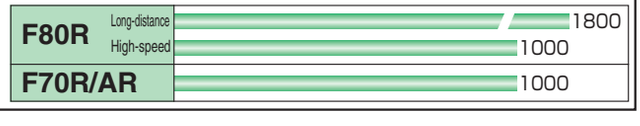
Used as a pair

Model		FTVW7YBC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0 (multi-core)
Allowable bending radius		R1
Standard detection object diameter		–
Smallest allowable detection object diameter		Φ0.2 (excluding F71R, F2R)

Applicable amplifier

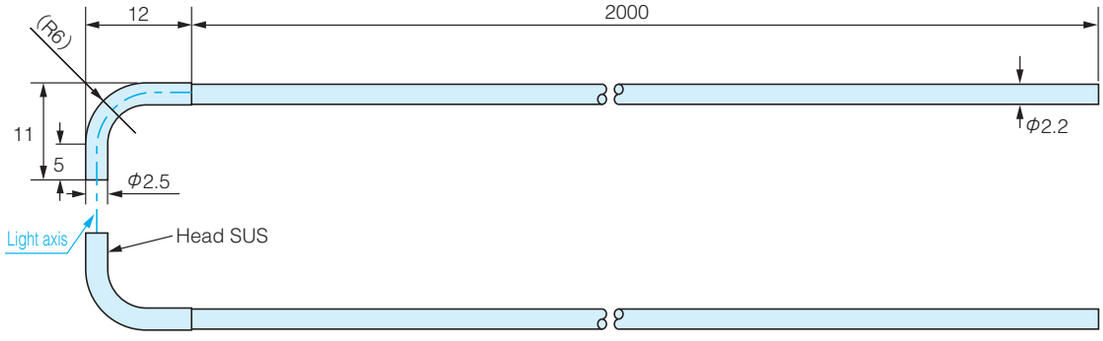


Detecting distances for individual amplifier models (mm)



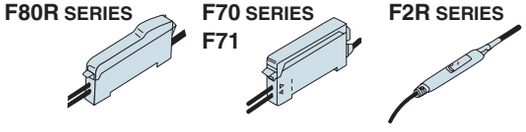
MODEL	FT704BC	Space saving elbow model	Search ID No.	43
Detection method	Through-beam			

CAD

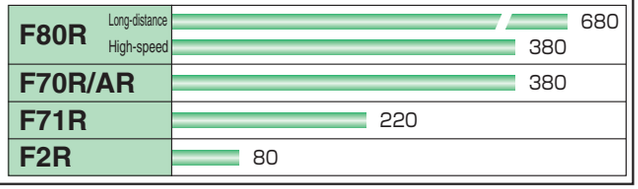


Model		FT704BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyvinyl chloride
	Core	Plastic
Diameter	Cable	2.2
	Core	φ0.265 x 16
Allowable bending radius		R30
Standard detection object diameter		φ1
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

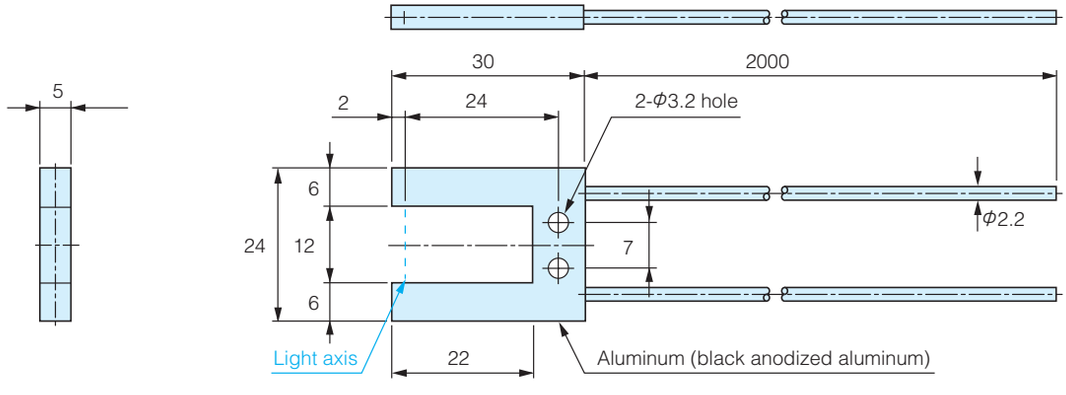


Detecting distances for individual amplifier models (mm)



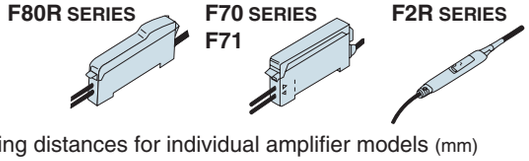
MODEL	FUH612BC	Heat-resistance 130 ºC, U-shaped model with fixed 12-mm detecting distance	Search ID No.	44
Detection method	Through-beam			

CAD



Model		FUH612BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Fluoroplastic
	Core	Thermosetting acrylic
Diameter	Cable	2.2
	Core	1.5
Allowable bending radius		R45
Standard detection object diameter		φ1
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

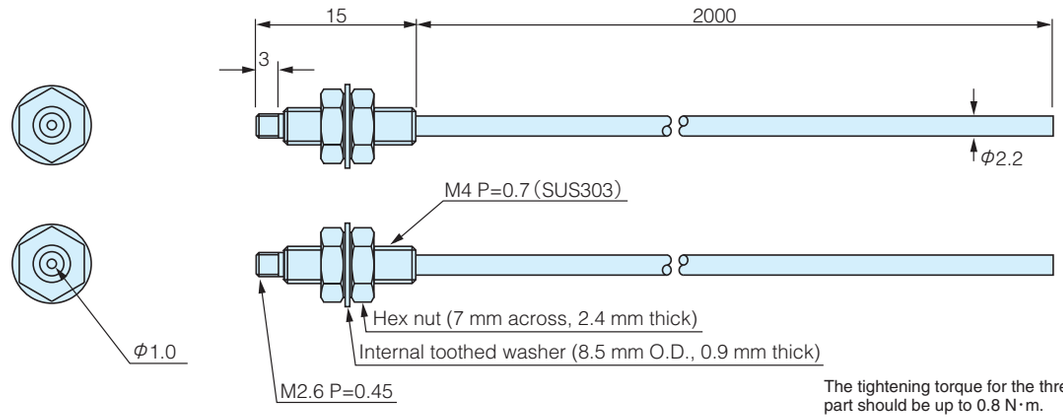


Detecting distances for individual amplifier models (mm)

Fiber Optic Cables

MODEL	FTH7BC	Lowest-cost heat-resistant model	Search ID No.	45
Detection method	Through-beam			

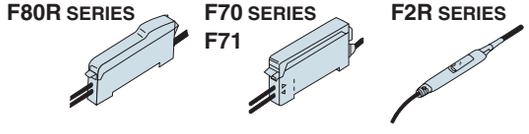
CAD



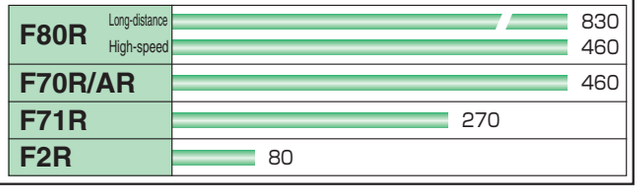
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FTH7BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 105 ºC
Material	Covering	Heat-resistant polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0
Allowable bending radius		R30
Standard detection object diameter		φ1
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

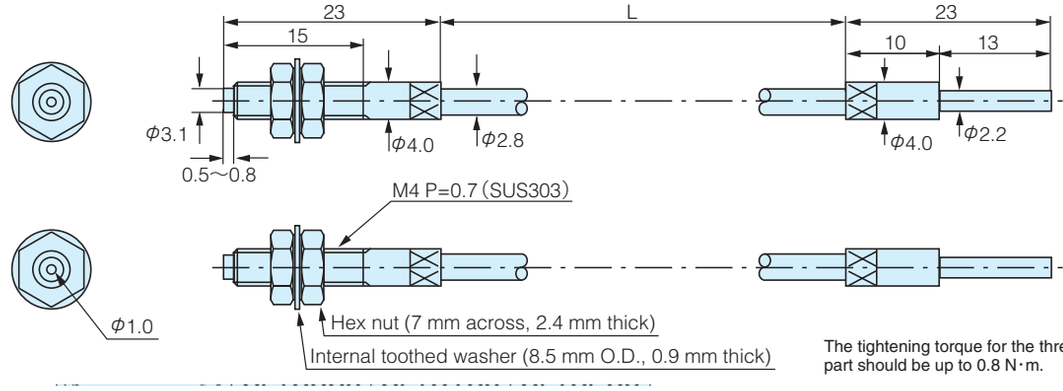


Detecting distances for individual amplifier models (mm)



MODEL	GLT500J series	Heat resistance 200 ºC, covered with fluoroplastic tube	Search ID No.	46
Detection method	Through-beam			

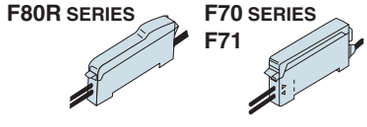
CAD



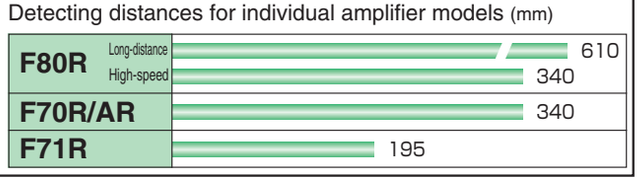
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		GLT505J	GLT510J	GLT520J
Fiber optic cable length(m)		0.5	1	2
Ambient temperature		Tip: – 60 ~ +200 ºC / Covering: 200 ºC		
Material	Covering	Fluoroplastic		
	Core	Glass		
Diameter	Cable	2.8		
	Core	Binding diameter: 1.0 mm		
Allowable bending radius		R25		
Standard detection object diameter		φ1		
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)		

Applicable amplifier

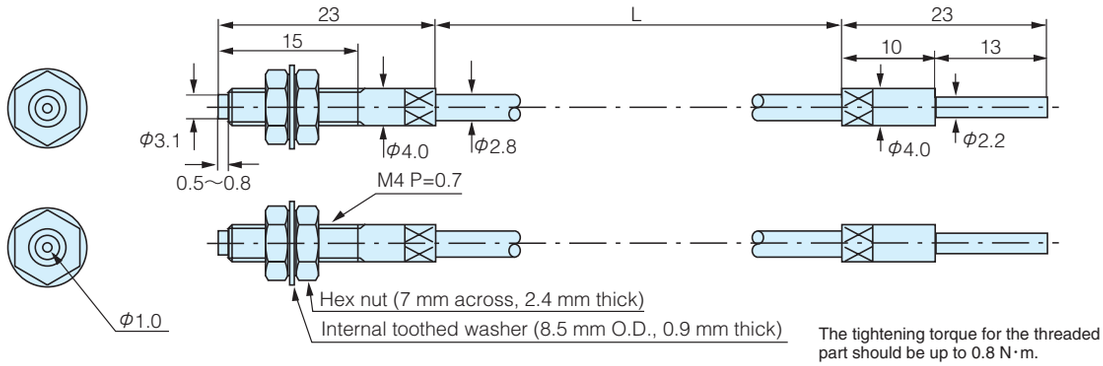


Detecting distances for individual amplifier models (mm)



MODEL	GT500J series	Heat resistance 200 ºC with M4 screw	Search ID No.	47
Detection method	Through-beam			

CAD

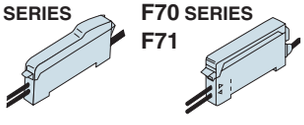


The tightening torque for the threaded part should be up to 0.8 N·m.

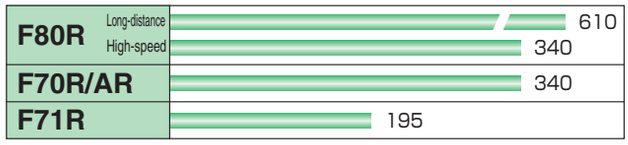
Model		GT505J	GT510J	GT520J
Fiber optic cable length(m)		0.5	1	2
Ambient temperature		Tip: – 60 ~ +200 ºC / Covering: 200 ºC		
Material	Covering	Silicon tube		
	Core	Glass		
Diameter	Cable	2.8		
	Core	Binding diameter: 1.0 mm		
Allowable bending radius		R25		
Standard detection object diameter		φ1		
Smallest allowable detection object diameter		φ0.015 (excluding F71R)		

Applicable amplifier

F80R SERIES F70 SERIES F71

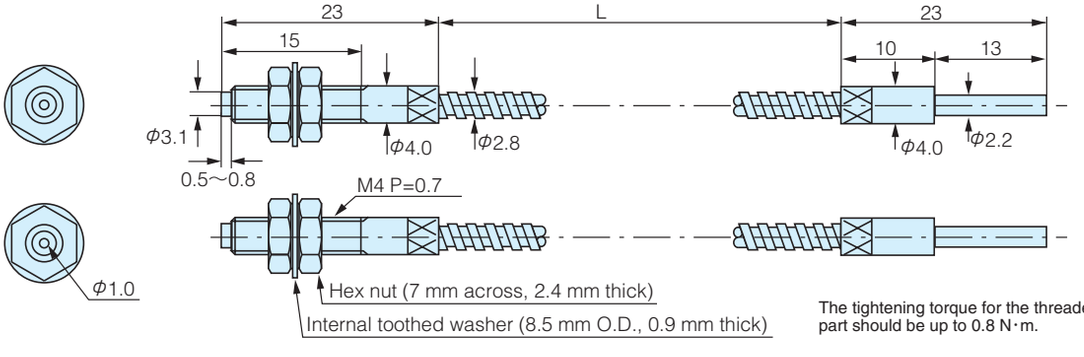


Detecting distances for individual amplifier models (mm)



MODEL	GTH500J series	Heat resistance 350 ºC with SS spiral tube cover	Search ID No.	48
Detection method	Through-beam			

CAD

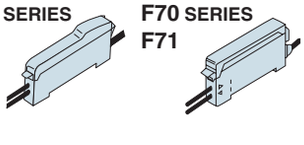


The tightening torque for the threaded part should be up to 0.8 N·m.

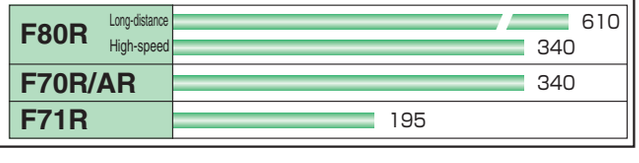
Model		GTH505J	GTH510J	GTH520J
Fiber optic cable length(m)		0.5	1	2
Ambient temperature		– 60 ~ + 350 ºC		
Material	Covering	SUS spiral		
	Core	Glass		
Diameter	Cable	2.8		
	Core	Binding diameter: 1.0 mm		
Allowable bending radius		R25		
Standard detection object diameter		φ1		
Smallest allowable detection object diameter		φ0.015 (excluding F71R)		

Applicable amplifier

F80R SERIES F70 SERIES F71



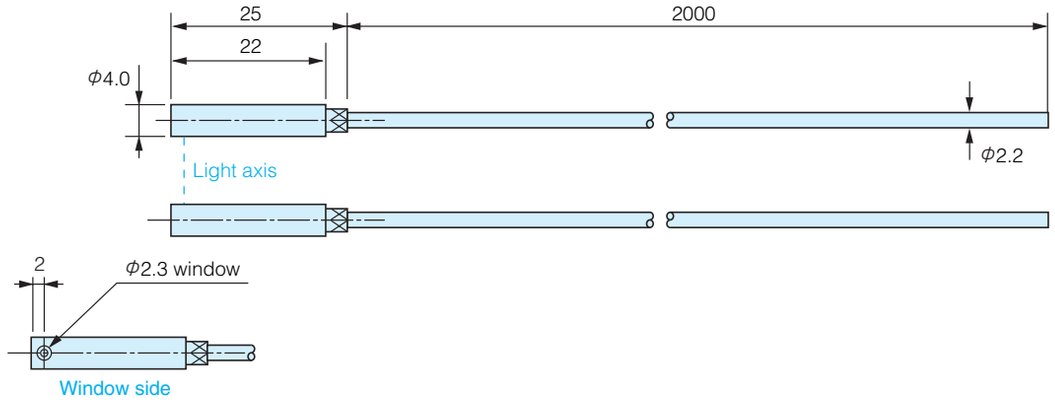
Detecting distances for individual amplifier models (mm)



Fiber Optic Cables

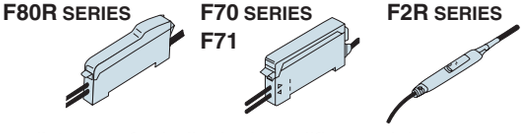
MODEL	FTHV74BC	Low-cost, heat resistance 105 ºC	Search ID No.	49
Detection method	Through-beam			

CAD

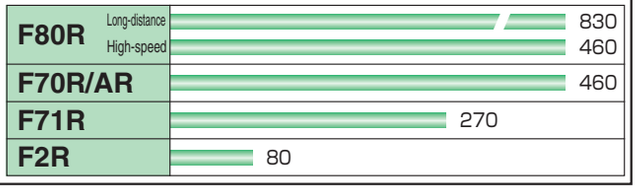


Model		FTHV74BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 105 ºC
Material	Covering	Heat-resistant polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0
Allowable bending radius		R30
Standard detection object diameter		φ2
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

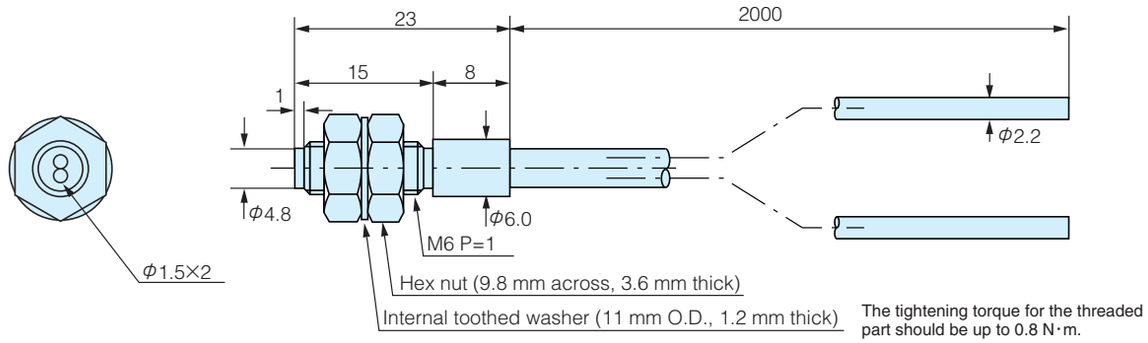


Detecting distances for individual amplifier models (mm)



MODEL	FR105BC	M6 screw, longest-distance model	Search ID No. 50
Detection method	Reflective		

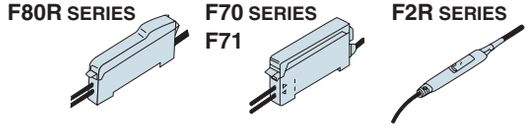
CAD



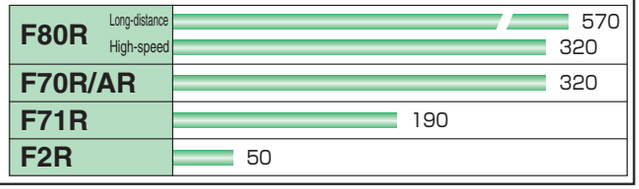
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FR105BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.5
Allowable bending radius		R45
Standard detection object diameter		400 x 400mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

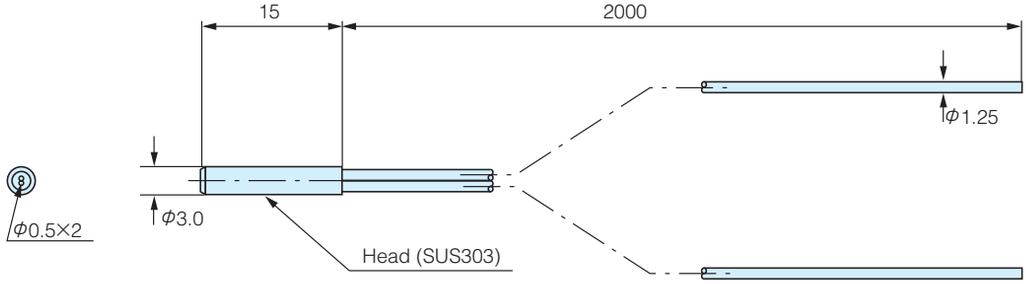


Detecting distances for individual amplifier models (mm)



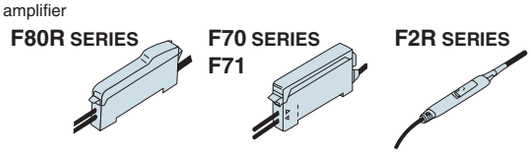
MODEL	FR83BC	φ3 unthreaded head, φ1.25 small-diameter fiber optic cable	Search ID No. 51
Detection method	Reflective		

CAD

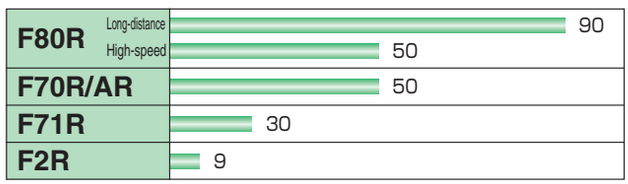


Model		FR83BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.5
Allowable bending radius		R15
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier



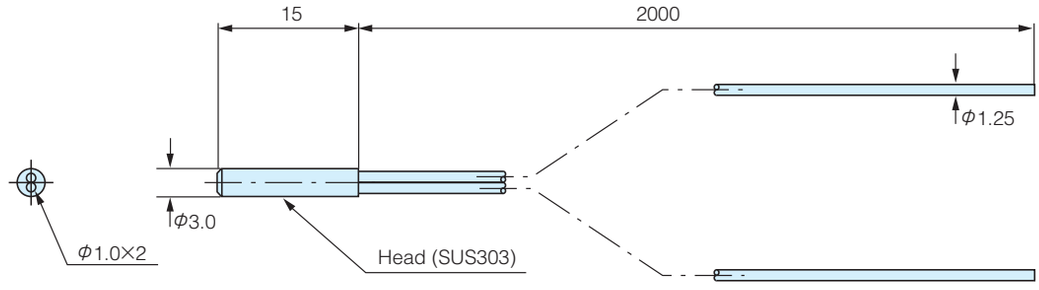
Detecting distances for individual amplifier models (mm)



Fiber Optic Cables

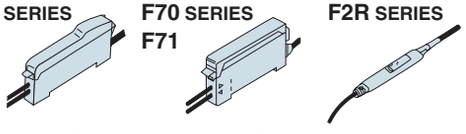
MODEL	FR1083BC	φ3 unthreaded head, φ1.25 small-diameter fiber optic cable	Search ID No. 52
Detection method	Reflective		

CAD

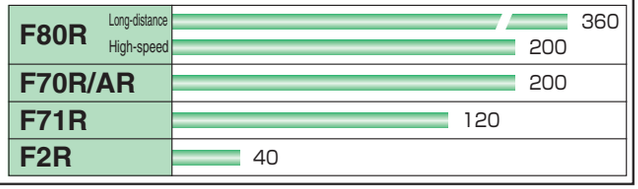


Model		FR1083BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	1.0
Allowable bending radius		R30
Standard detection object diameter		200 x 200mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

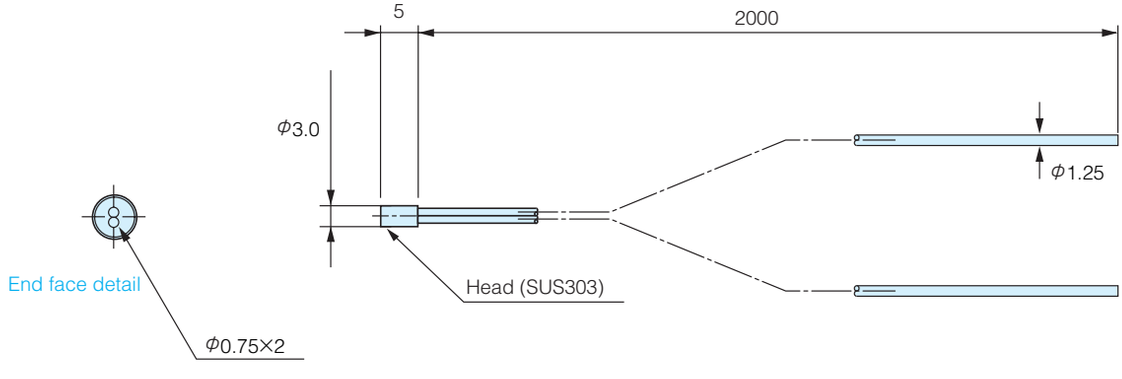


Detecting distances for individual amplifier models (mm)



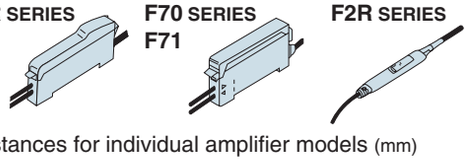
MODEL	FR835BC	φ3 unthreaded short head	Search ID No. 53
Detection method	Reflective		

CAD

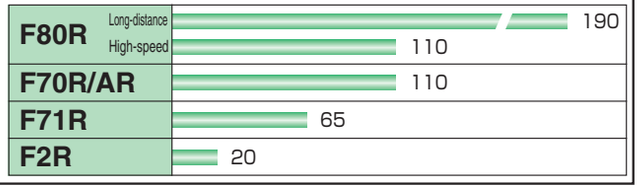


Model		FR835BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.75
Allowable bending radius		R20
Standard detection object diameter		100 x 100mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

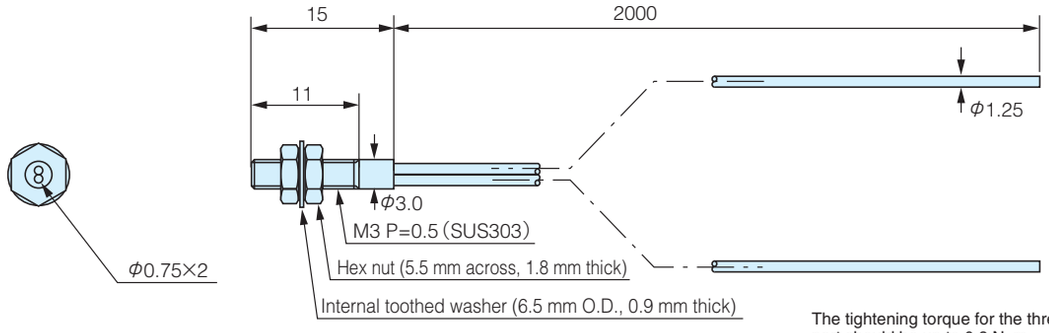


Detecting distances for individual amplifier models (mm)



MODEL	FR8EBC	Low cost long distance detection	Search ID No. 54
Detection method	Reflective		

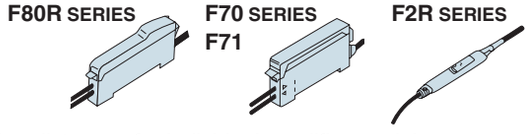
CAD



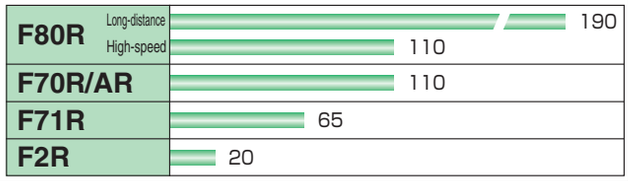
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FR8EBC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.75
Allowable bending radius		R20
Standard detection object diameter		100 x 100mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

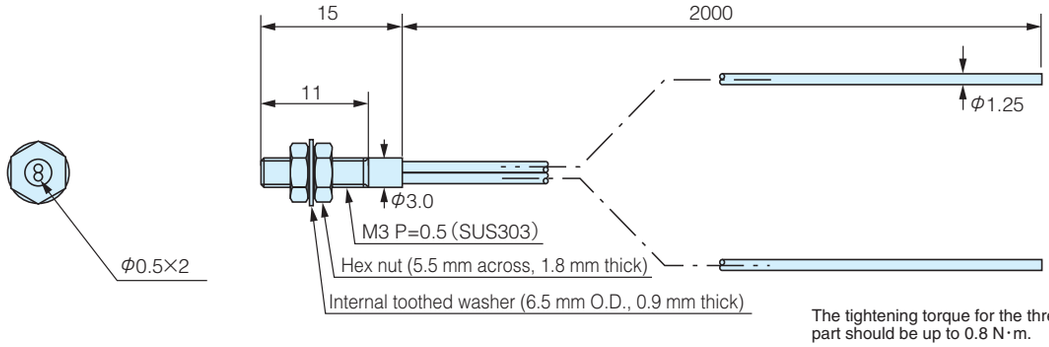


Detecting distances for individual amplifier models (mm)



MODEL	FR8BC	Small-diameter fiber optic cable with M3 screw	Search ID No. 55
Detection method	Reflective		

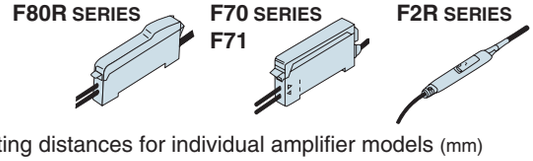
CAD



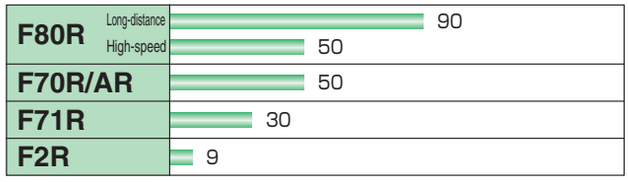
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FR8BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.5
Allowable bending radius		R15
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier



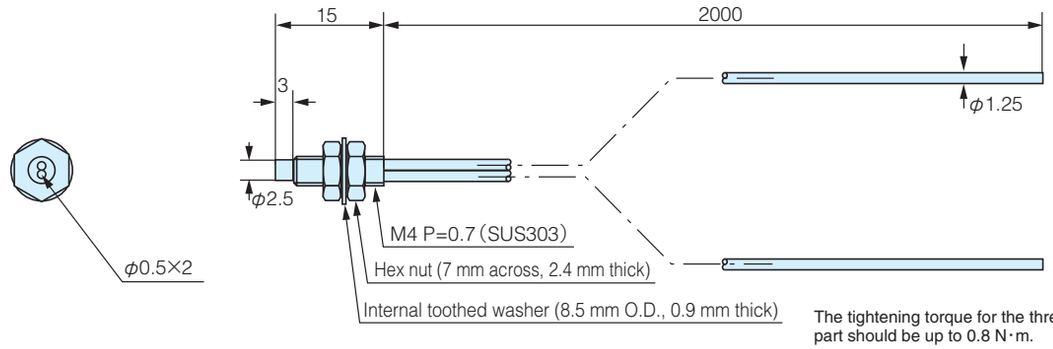
Detecting distances for individual amplifier models (mm)



Fiber Optic Cables

MODEL	FR84BC	φ1.25 small-diameter fiber optic cable with φ2.5 head with M4 screw	Search ID No. 56
Detection method	Reflective		

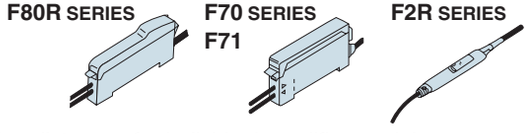
CAD



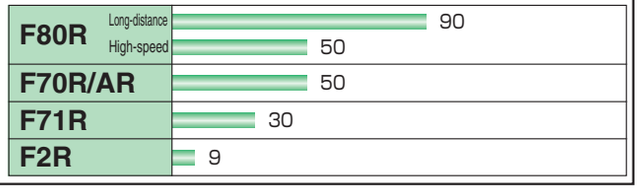
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FR84BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.5
Allowable bending radius		R15
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

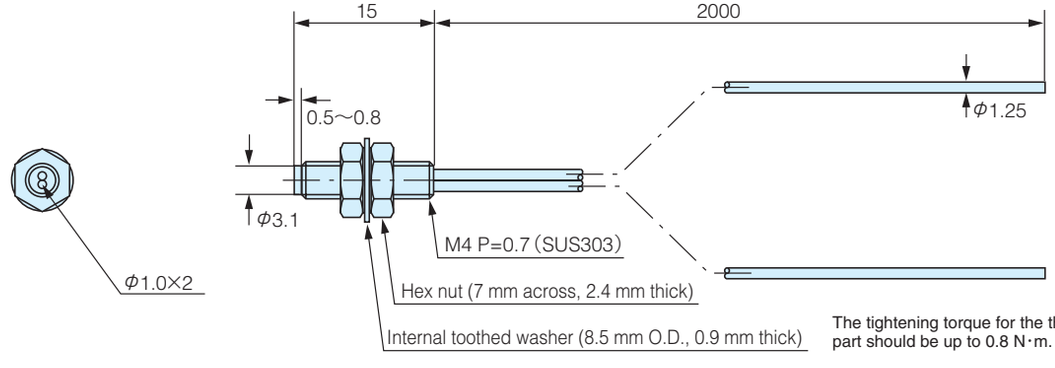


Detecting distances for individual amplifier models (mm)



MODEL	FR108BC	Generic model with M4 screw	Search ID No. 57
Detection method	Reflective		

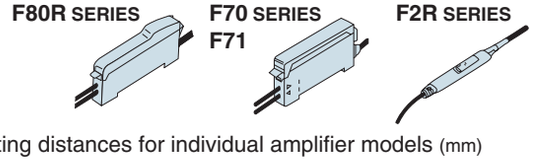
CAD



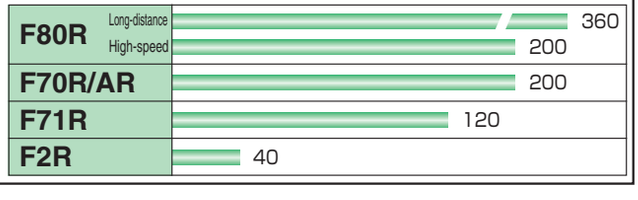
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FR108BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	1.0
Allowable bending radius		R30
Standard detection object diameter		200 x 200mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

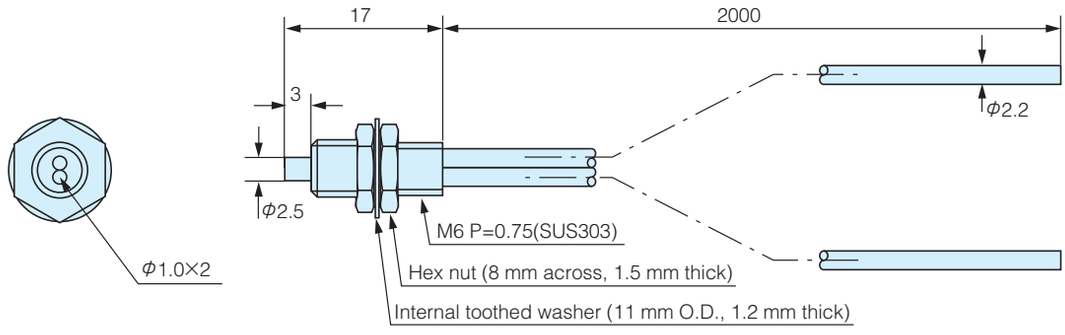


Detecting distances for individual amplifier models (mm)



MODEL	FR7BC	Low-cost, ϕ2.5mm head with M6 screw	Search ID No. 58
Detection method	Reflective		

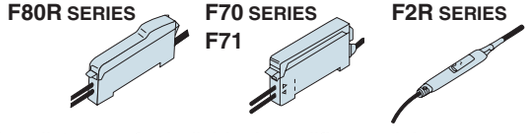
CAD



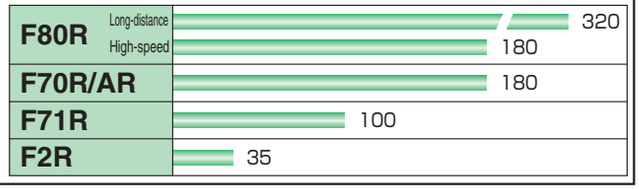
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FR7BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0
Allowable bending radius		R30
Standard detection object diameter		200 x 200mm white drawing paper (with F70R)
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier

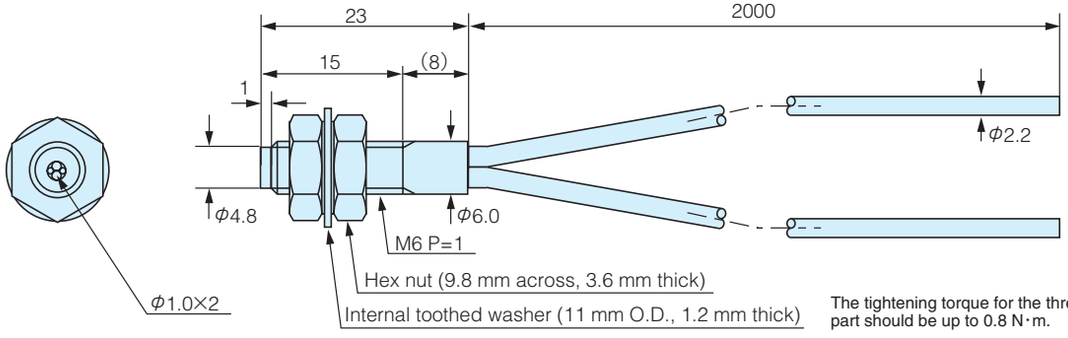


Detecting distances for individual amplifier models (mm)



MODEL	FR5BC	M6 screw, long-distance detection	Search ID No. 59
Detection method	Reflective		

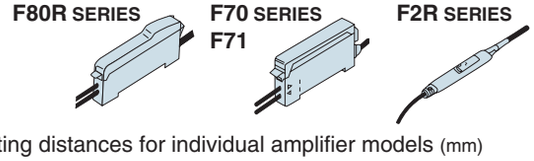
CAD



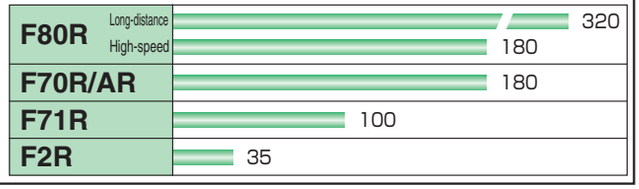
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FR5BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0
Allowable bending radius		R30
Standard detection object diameter		200 x 200mm white drawing paper (with F70R)
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier



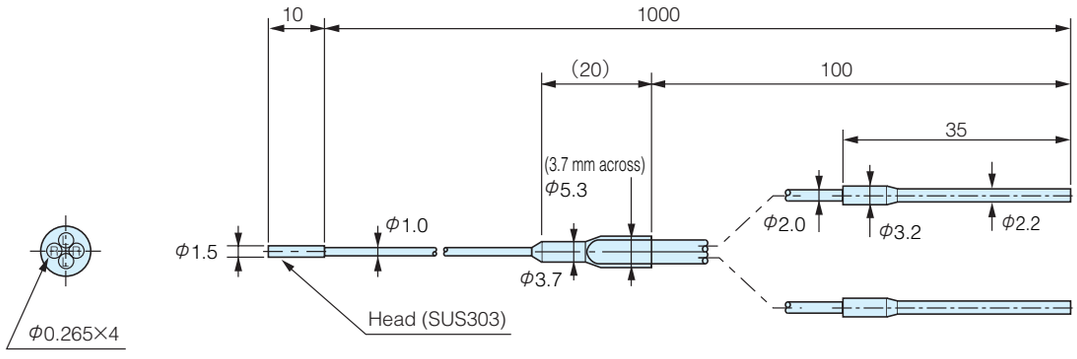
Detecting distances for individual amplifier models (mm)



Fiber Optic Cables

MODEL	FR91Y10	φ1.5 unthreaded, allowable bending radius 4 mm	Search ID No.	60
Detection method	Reflective			

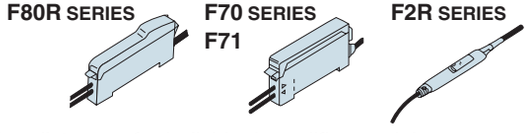
CAD



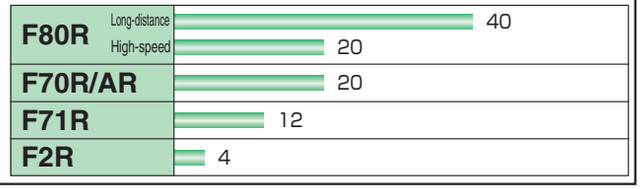
End face detail

Model		FR91Y10
Fiber optic cable length(m)		1
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.0
	Core	φ0265 x 4
Allowable bending radius		R4
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R)

Applicable amplifier

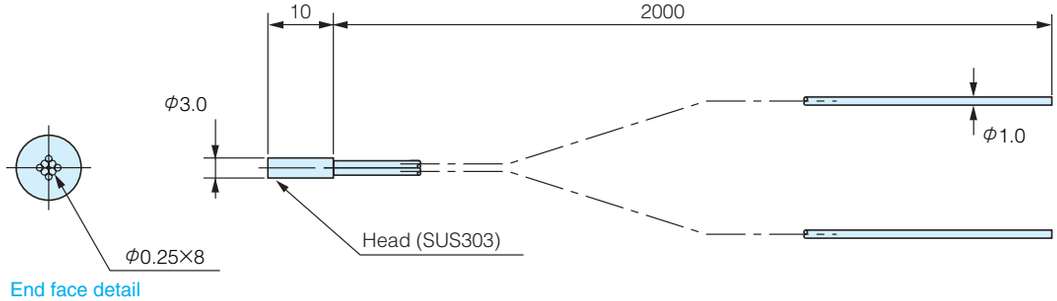


Detecting distances for individual amplifier models (mm)



MODEL	FR93BC	φ3 unthreaded short head, allowable bending radius 4 mm	Search ID No.	61
Detection method	Reflective			

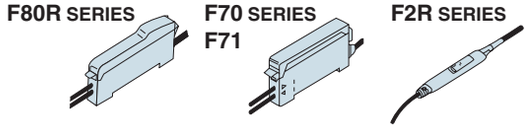
CAD



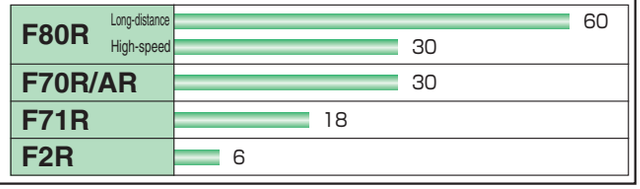
End face detail

Model		FR93BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.0
	Core	0.25 x 8
Allowable bending radius		R4
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

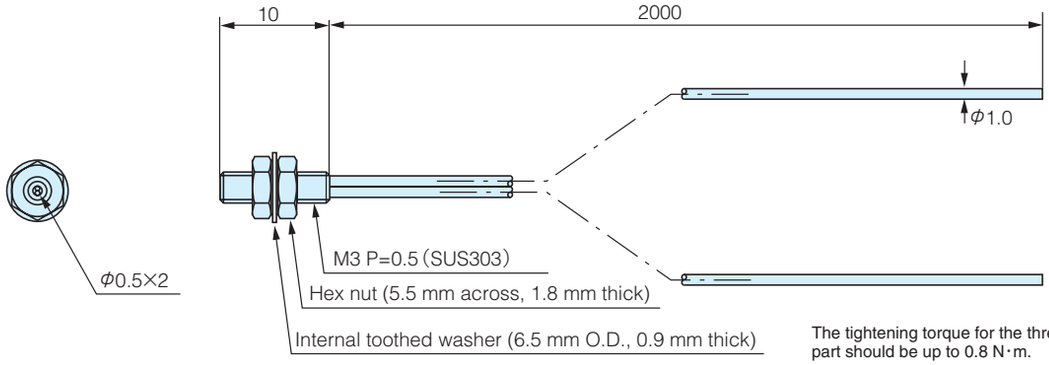


Detecting distances for individual amplifier models (mm)



MODEL	FR19YBC	M3 threaded short head, allowable minimum bending radius 1.0 mm	Search ID No. 62
Detection method	Reflective		

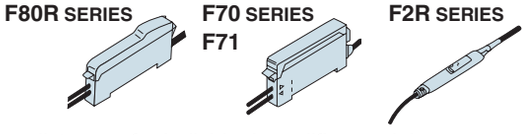
CAD



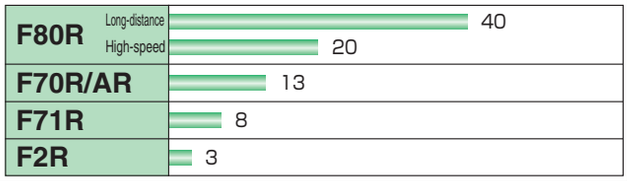
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FR19YBC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.0
	Core	0.5 (multi-core)
Allowable bending radius		R1
Standard detection object diameter		25 x 25mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

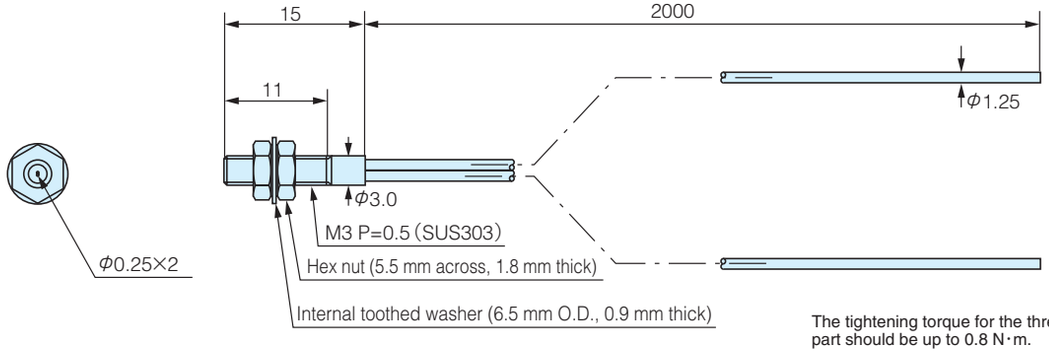


Detecting distances for individual amplifier models (mm)



MODEL	FR8YBC	M3 screw, allowable bending radius 4 mm	Search ID No. 63
Detection method	Reflective		

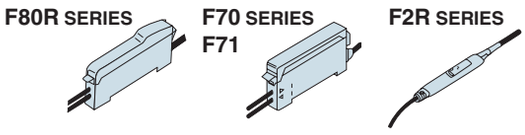
CAD



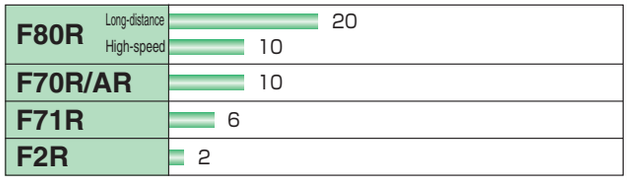
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FR8YBC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.25
Allowable bending radius		R4
Standard detection object diameter		25 x 25mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier



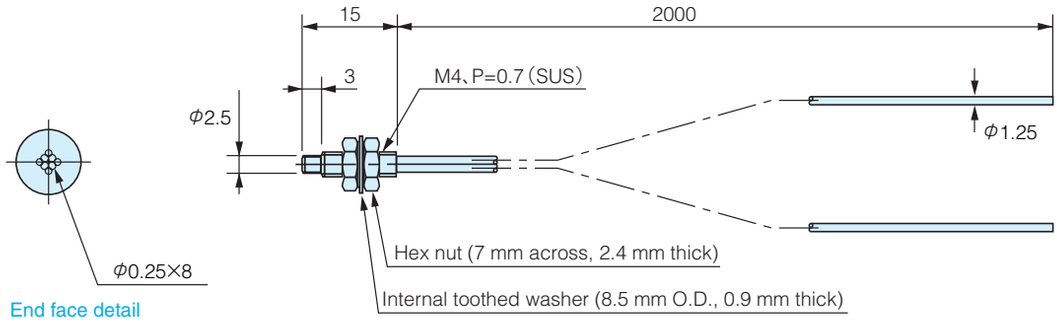
Detecting distances for individual amplifier models (mm)



Fiber Optic Cables

MODEL	FR84YBC	M4 screw, allowable minimum bending radius 4 mm	Search ID No.	64
Detection method	Reflective			

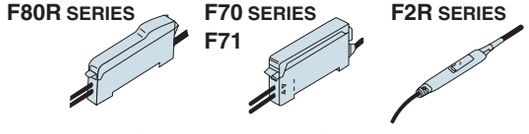
CAD



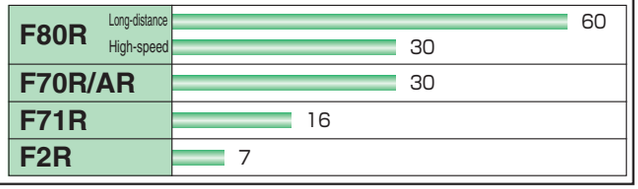
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FR84YBC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.25 x 8
Allowable bending radius		R4
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

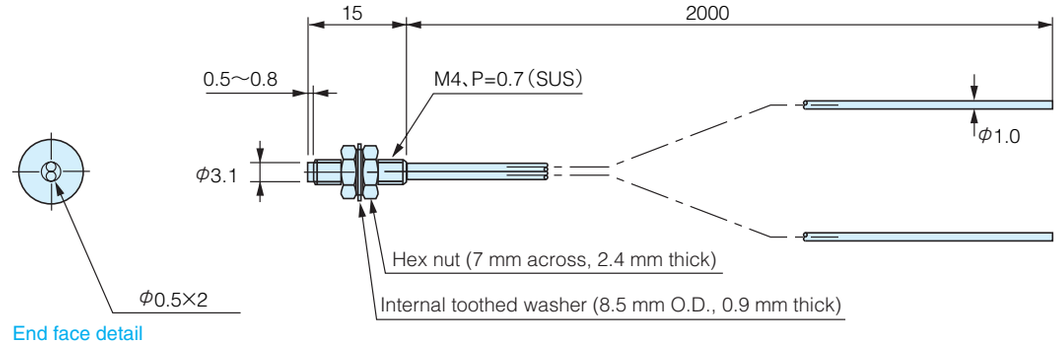


Detecting distances for individual amplifier models (mm)



MODEL	FR194YBC	M4 screw, allowable minimum bending radius 1.0 mm	Search ID No.	65
Detection method	Reflective			

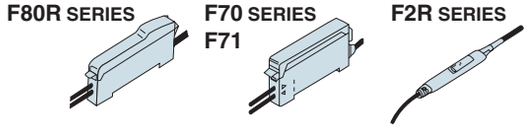
CAD



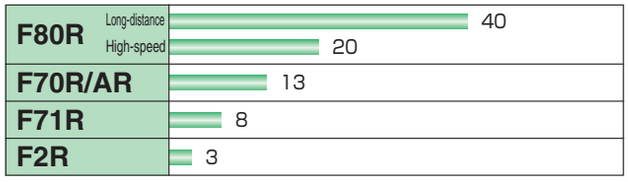
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FR194YBC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.0
	Core	0.5 (multi-core)
Allowable bending radius		R1
Standard detection object diameter		25 x 25mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

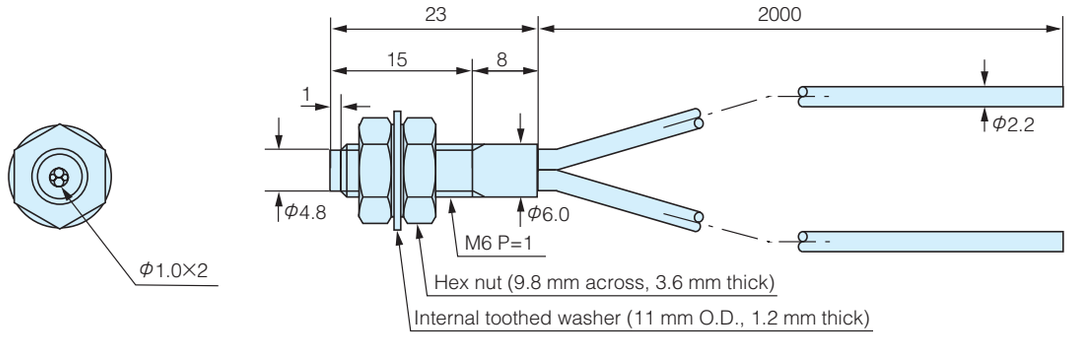


Detecting distances for individual amplifier models (mm)



MODEL	FR5YBC	M6 screw, allowable minimum bending radius 1.0 mm	Search ID No. 66
Detection method	Reflective		

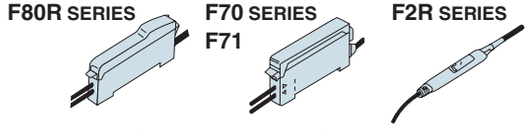
CAD



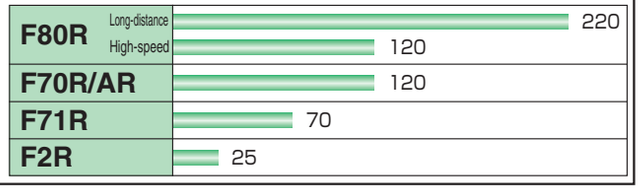
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FR5YBC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0 (multi-core)
Allowable bending radius		R1
Standard detection object diameter		200 x 200mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

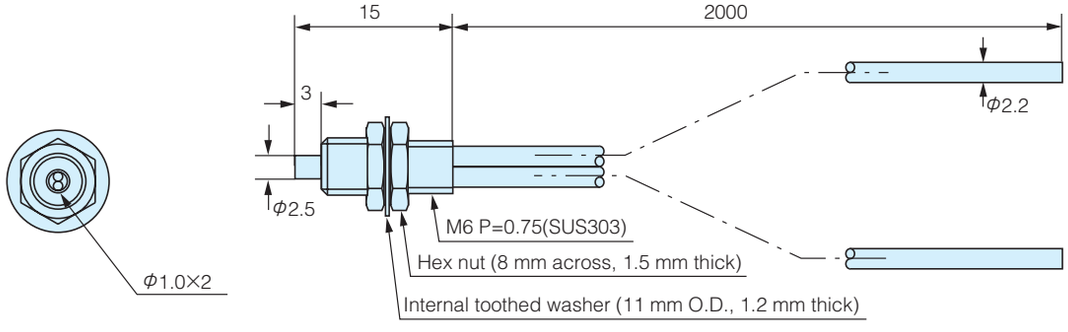


Detecting distances for individual amplifier models (mm)



MODEL	FR7YBC	M6 screw short head, allowable minimum bending radius 1.0 mm	Search ID No. 67
Detection method	Reflective		

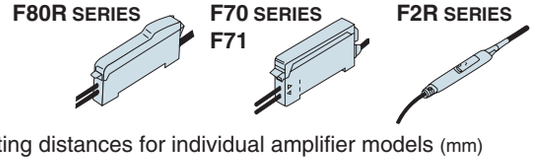
CAD



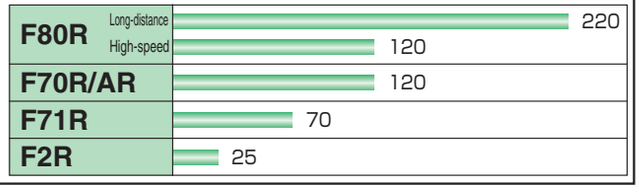
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FR7YBC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0 (multi-core)
Allowable bending radius		R1
Standard detection object diameter		200 x 200mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier



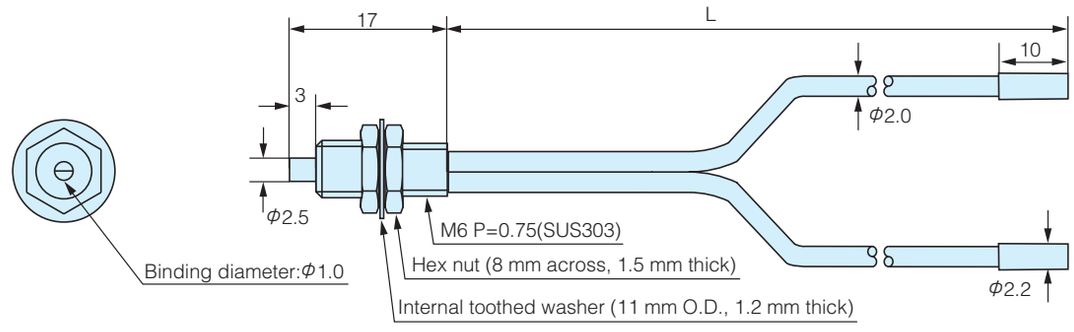
Detecting distances for individual amplifier models (mm)



Fiber Optic Cables

MODEL	**GXK series**	Allowable bending radius 3.5 mm is achieved with glass fiber, excellent space saving	Search ID No.	68
Detection method	Reflective			

CAD

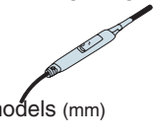


The tightening torque for the threaded part should be up to 0.8 N·m.

Model		GXK9605	GXK9610
Fiber optic cable length(m)		0.5	1
Ambient temperature		– 30 ~ + 70 ºC	
Material	Covering	Vinyl chloride	
	Core	Glass	
Diameter	Cable	2.0	
	Core	Binding diameter: 1.0 mm	
Allowable bending radius		R3.5	
Standard detection object diameter		25 x 25mm white drawing paper	
Smallest allowable detection object diameter		φ0.02	

Applicable amplifier

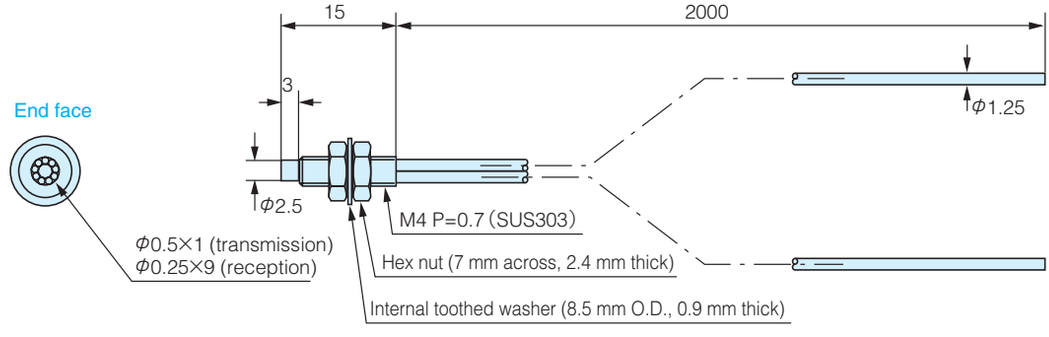
F2R SERIES



Detecting distances for individual amplifier models (mm)

MODEL	**FXN84BC**	Narrow-view coaxial with 1 transmitting and 9 receiving fibers	Search ID No.	69
Detection method	Coaxial reflective			

CAD

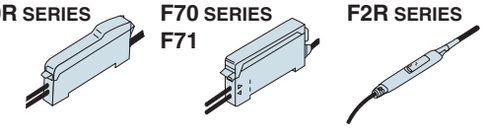


The tightening torque for the threaded part should be up to 0.8 N·m.

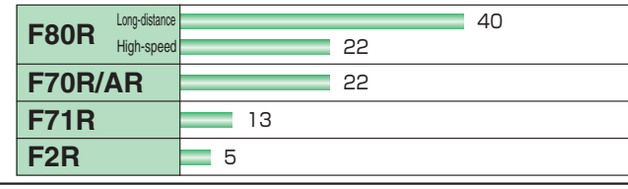
Model		FXN84BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	Transmission: φ0.5 x 1 / Reception: φ0.25 x 9
Allowable bending radius		R15
Standard detection object diameter		25 x 25mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

F80R SERIES **F70 SERIES** **F71** **F2R SERIES**

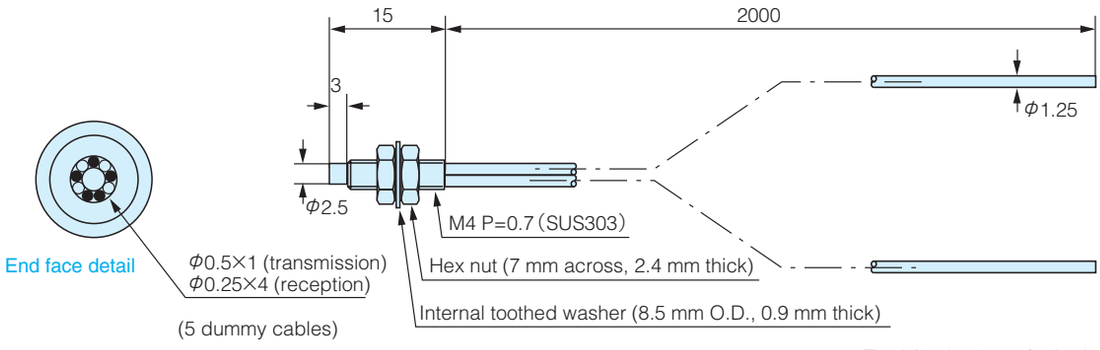


Detecting distances for individual amplifier models (mm)



MODEL	**FXN841BC**	Narrow-view, ϕ1.5 spot at 5 mm	Search ID No.	70
Detection method	Coaxial reflective			

CAD

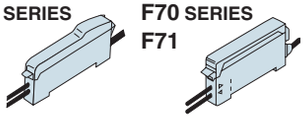


The tightening torque for the threaded part should be up to 0.8 N·m.

Model		**FXN841BC**
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	Transmission: ϕ0.5 x 1 / Reception: ϕ0.25 x 4
Allowable bending radius		R15
Standard detection object diameter		25 x 25mm white drawing paper (with F70R)
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier

F80R SERIES **F70 SERIES** **F71**

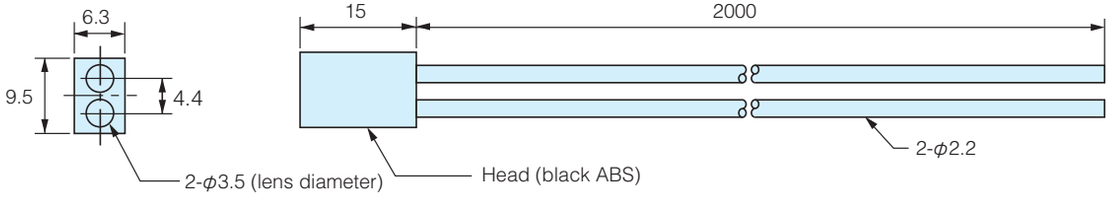


Detecting distances for individual amplifier models (mm)

F80R	Long-distance	12
	High-speed	6
F70R/AR		5.5
F71R		3

MODEL	**FR707BC**	Narrow-view, angle of aperture 10˚	Search ID No.	71
Detection method	Reflective			

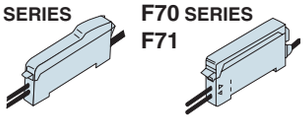
CAD



Model		**FR707BC**
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0
Allowable bending radius		R30
Standard detection object diameter		200 x 200mm white drawing paper (with F70R)
Smallest allowable detection object diameter		ϕ0.3 (excluding F71R, F2R)

Applicable amplifier

F80R SERIES **F70 SERIES** **F71**



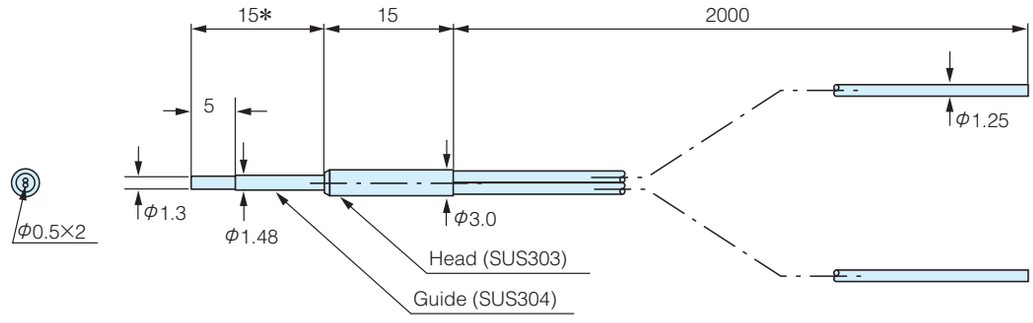
Detecting distances for individual amplifier models (mm)

F80R	Long-distance	30~270
	High-speed	30~150
F70R/AR		30~150
F71R		30~110

Fiber Optic Cables

MODEL	FRS83BC	ϕ1.3 head, ϕ1.25 fiber optic cable	Search ID No. 72
Detection method	Reflective		

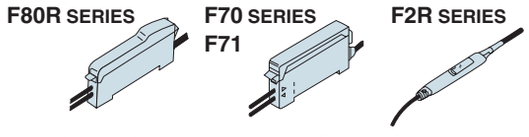
CAD



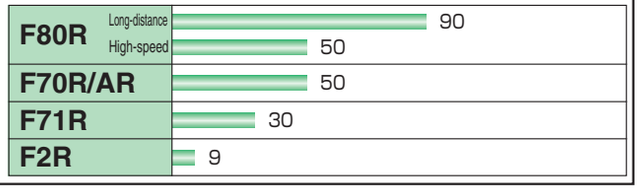
Do not bend the part marked with *.

Model		FRS83BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.5
Allowable bending radius		R15
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier

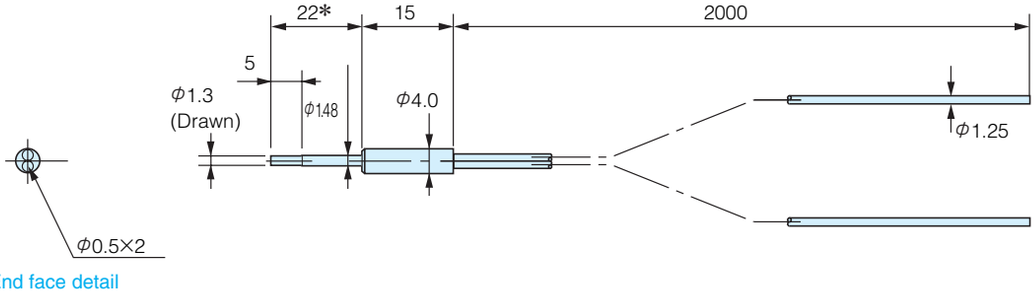


Detecting distances for individual amplifier models (mm)



MODEL	FRS801BC	ϕ4 unthreaded SS 22 mm	Search ID No. 73
Detection method	Reflective		

CAD

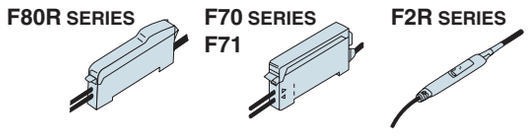


End face detail

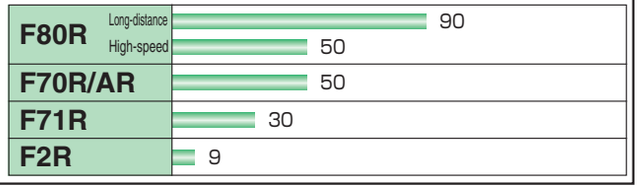
Do not bend the part marked with *.

Model		FRS801BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.5
Allowable bending radius		R15
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier

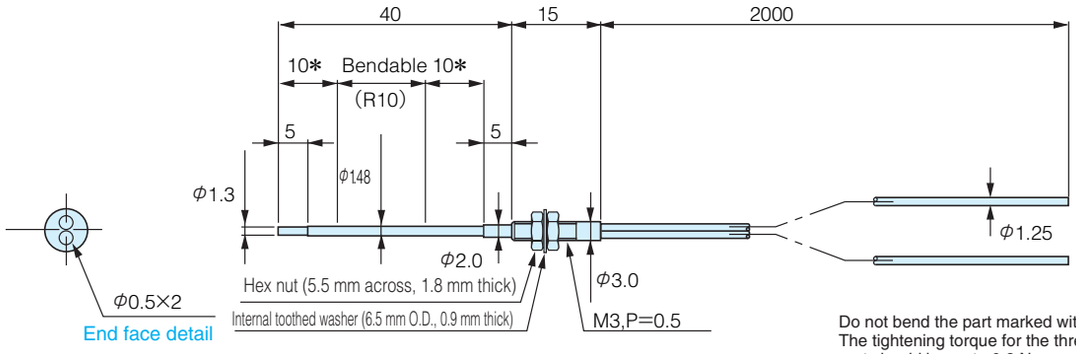


Detecting distances for individual amplifier models (mm)



MODEL	FRS806BC	SS 40 mm with M3 screw	Search ID No. 74
Detection method	Reflective		

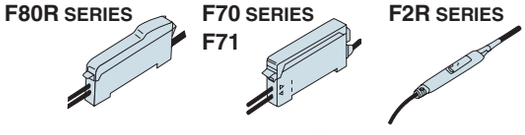
CAD



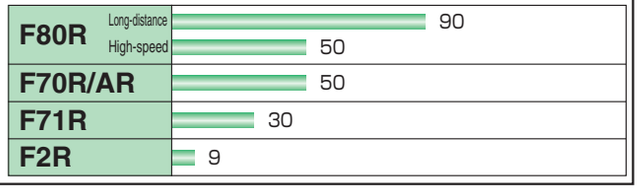
Do not bend the part marked with *.
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FRS806BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.5
Allowable bending radius		SUS part: R10 / Fiber optic cable: R15
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

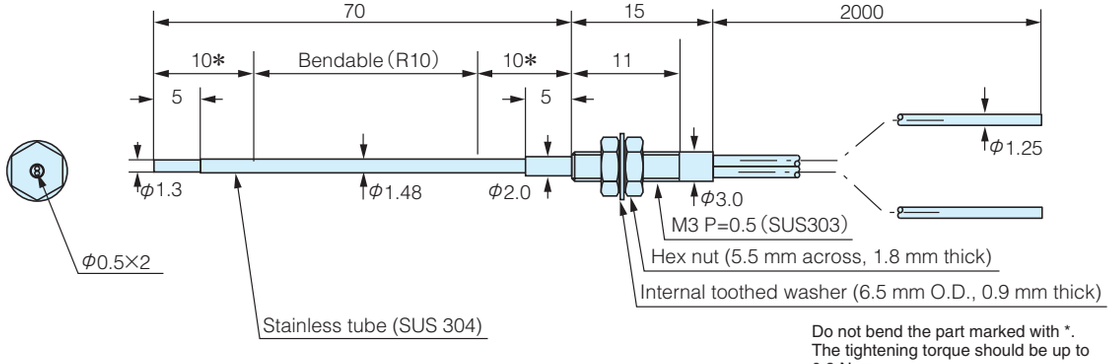


Detecting distances for individual amplifier models (mm)



MODEL	FRS8BC	70 mm SS tube with M3 screw, φ1.25 fiber optic cable	Search ID No. 75
Detection method	Reflective		

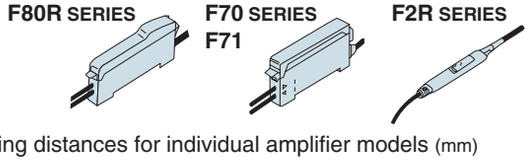
CAD



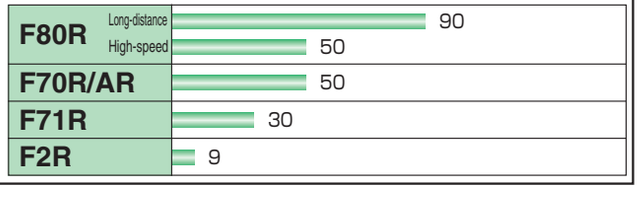
Do not bend the part marked with *.
The tightening torque should be up to 0.8 N·m.

Model		FRS8BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.5
Allowable bending radius		SUS part: R10 / Fiber optic cable: R15
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier



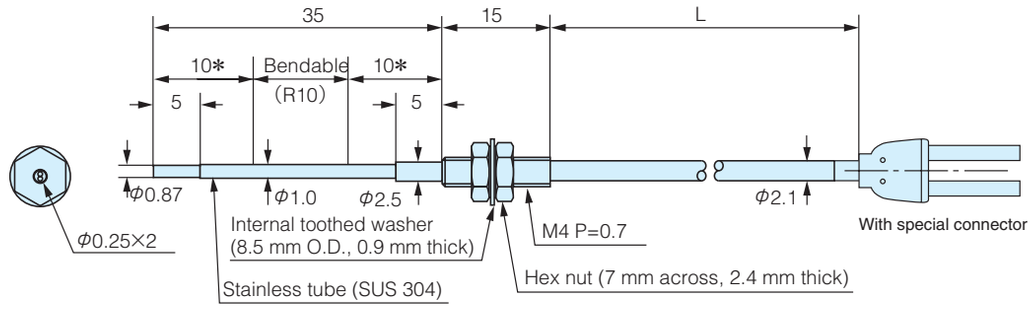
Detecting distances for individual amplifier models (mm)



Fiber Optic Cables

MODEL	FRS2003J series	ϕ0.9 head, 35 mm SS tube with M4 screw	Search ID No. 76
Detection method	Reflective		

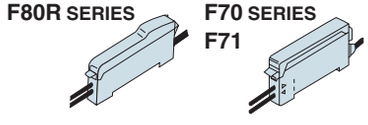
CAD



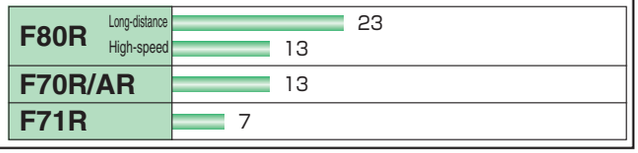
Do not bend the part marked with *.
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FRS2053J	FRS2103J
Fiber optic cable length(m)		0.5	1
Ambient temperature		– 30 ~ + 70 ºC	
Material	Covering	Polyethylene	
	Core	Plastic	
Diameter	Cable	2.1	
	Core	0.25	
Allowable bending radius		SUS part: R10 / Fiber optic cable: R15	
Standard detection object diameter		25 x 25mm white drawing paper (with F70R)	
Smallest allowable detection object diameter		ϕ0.015	

Applicable amplifier

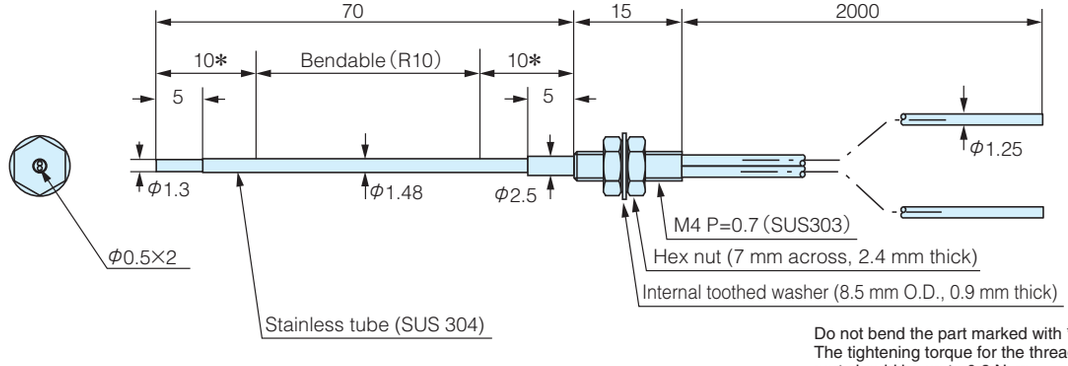


Detecting distances for individual amplifier models (mm)



MODEL	FRS84BC	70 mm SS tube with M4 screw	Search ID No. 77
Detection method	Reflective		

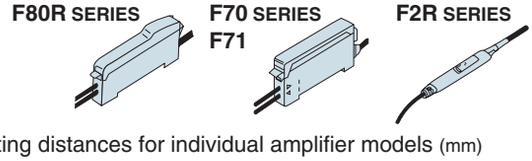
CAD



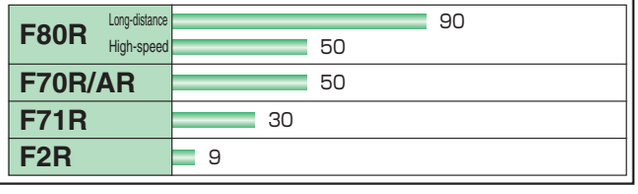
Do not bend the part marked with *.
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FRS84BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.5
Allowable bending radius		SUS part: R10 / Fiber optic cable: R15
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier

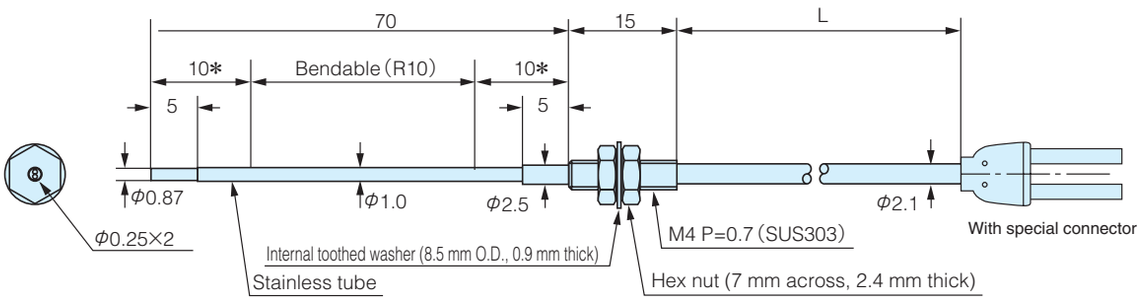


Detecting distances for individual amplifier models (mm)



MODEL	FRS200J series	ϕ0.87 head, 70 mm SS tube with M4 screw	Search ID No. 78
Detection method	Reflective		

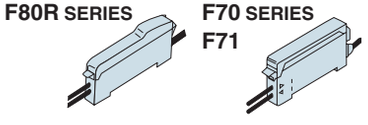
CAD



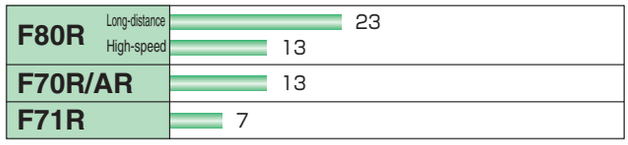
Do not bend the part marked with *.
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FRS205J	FRS210J
Fiber optic cable length(m)		0.5	1
Ambient temperature		– 30 ~ + 70 ºC	
Material	Covering	Polyethylene	
	Core	Plastic	
Diameter	Cable	2.1	
	Core	0.25	
Allowable bending radius		SUS part: R10 / Fiber optic cable: R15	
Standard detection object diameter		25 x 25mm white drawing paper (with F70R)	
Smallest allowable detection object diameter		ϕ0.015	

Applicable amplifier

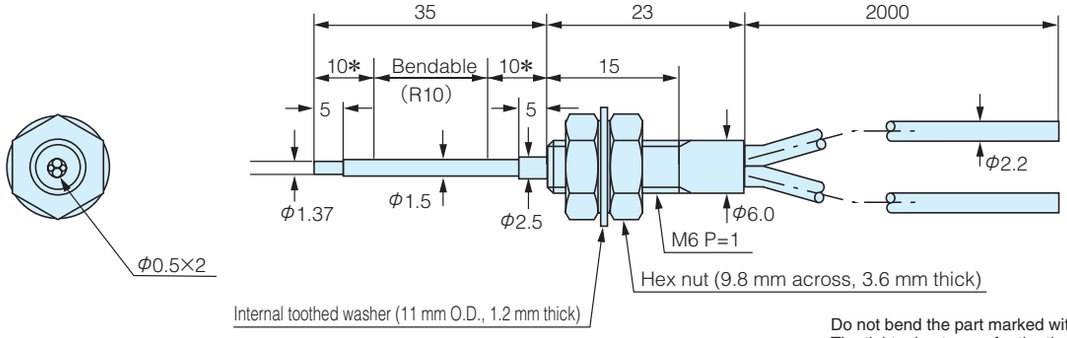


Detecting distances for individual amplifier models (mm)



MODEL	FRS53BC	35 mm SS tube with M6 screw	Search ID No. 79
Detection method	Reflective		

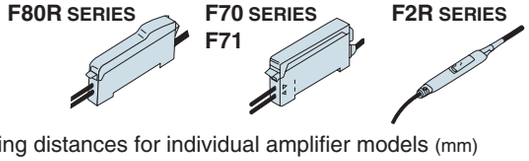
CAD



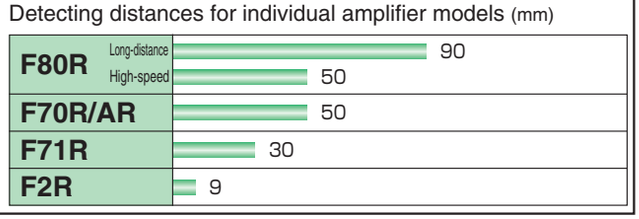
Do not bend the part marked with *.
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FRS53BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	0.5
Allowable bending radius		SUS part: R10/ Fiber optic cable: R15
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier



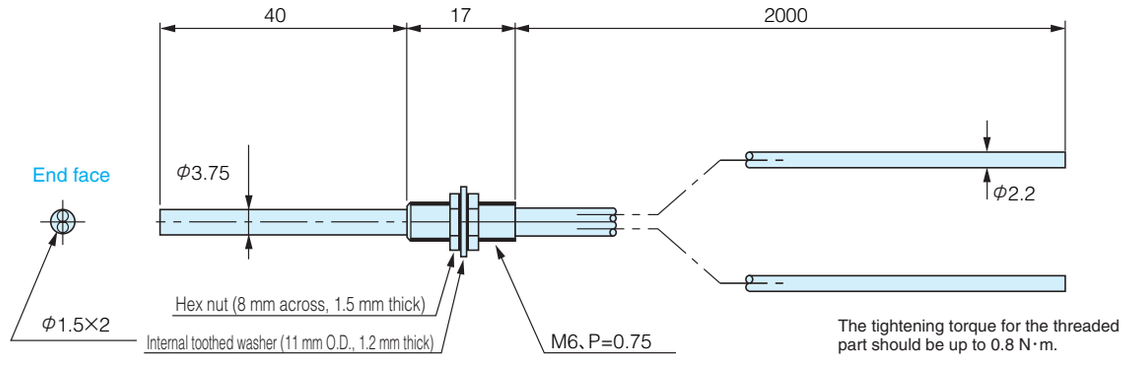
Detecting distances for individual amplifier models (mm)



Fiber Optic Cables

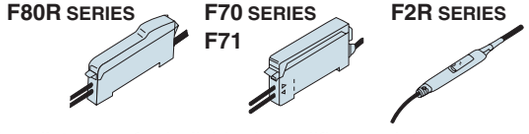
MODEL	FRS105BC	M6 screw SS 40 mm	Search ID No. 80
Detection method	Reflective		

CAD

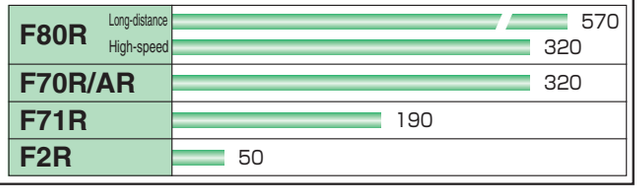


Model		FRS105BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.5
Allowable bending radius		R45
Standard detection object diameter		400 x 400mm white drawing paper(with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

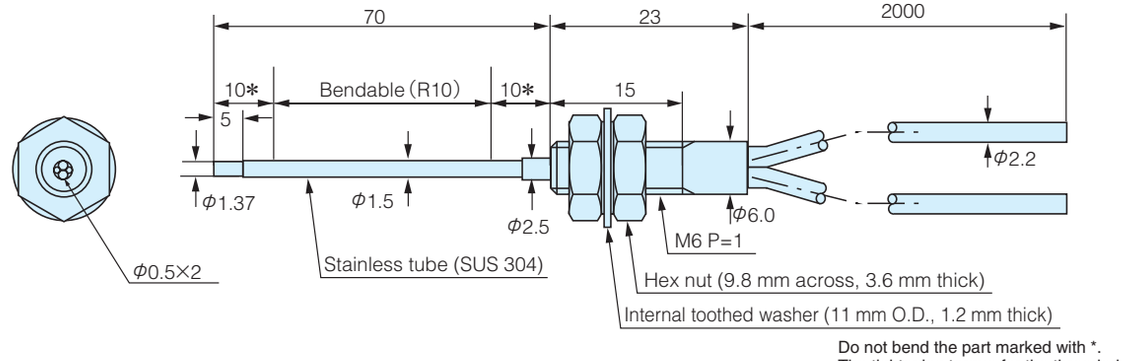


Detecting distances for individual amplifier models (mm)



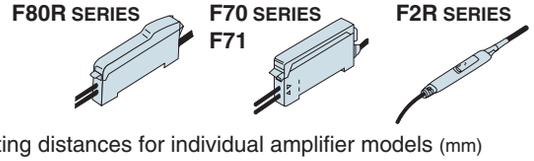
MODEL	FRS5BC	70 mm SS tube with M6 screw	Search ID No. 81
Detection method	Reflective		

CAD

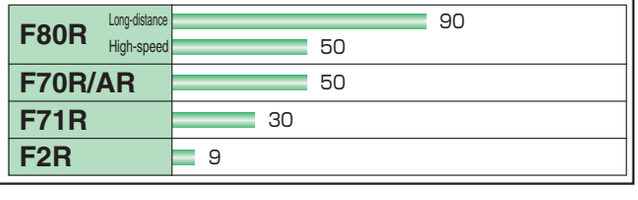


Model		FRS5BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	0.5
Allowable bending radius		SUS part: R10 / Fiber optic cable: R15
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

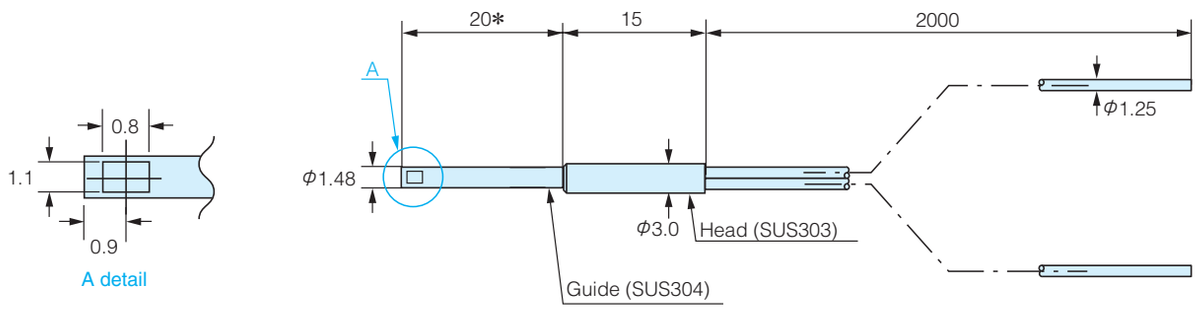


Detecting distances for individual amplifier models (mm)



MODEL	FRSV83BC	Side-view ϕ1.48 head, 20 mm SS tube with ϕ3 unthreaded head-unit	Search ID No.	82
Detection method	Reflective			

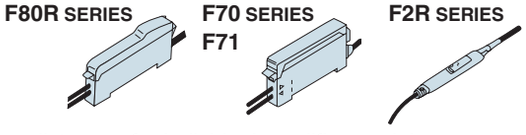
CAD



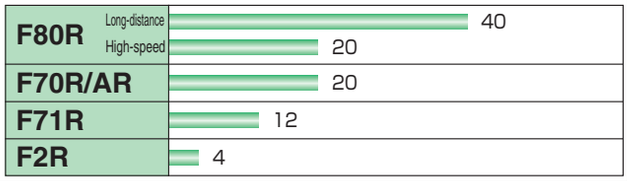
Do not bend the part marked with *.

Model		FRSV83BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.5
Allowable bending radius		R15
Standard detection object diameter		25 x 25mm white drawing paper (with F70R)
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier

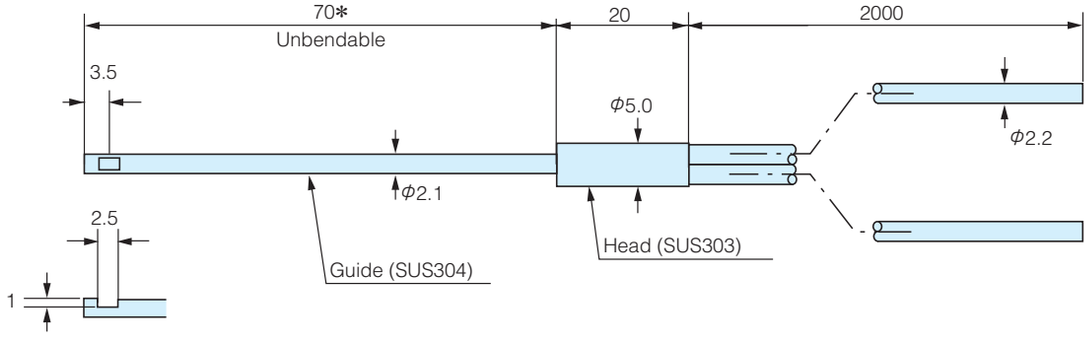


Detecting distances for individual amplifier models (mm)



MODEL	FRSV55BC	ϕ2.1 head, 70 mm SS tube with ϕ5 unthreaded part	Search ID No.	83
Detection method	Reflective			

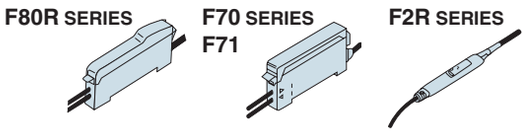
CAD



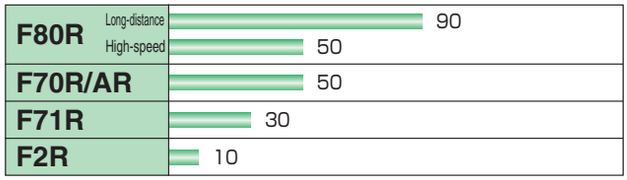
Do not bend the part marked with *.

Model		FRSV55BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	0.75
Allowable bending radius		R30
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier



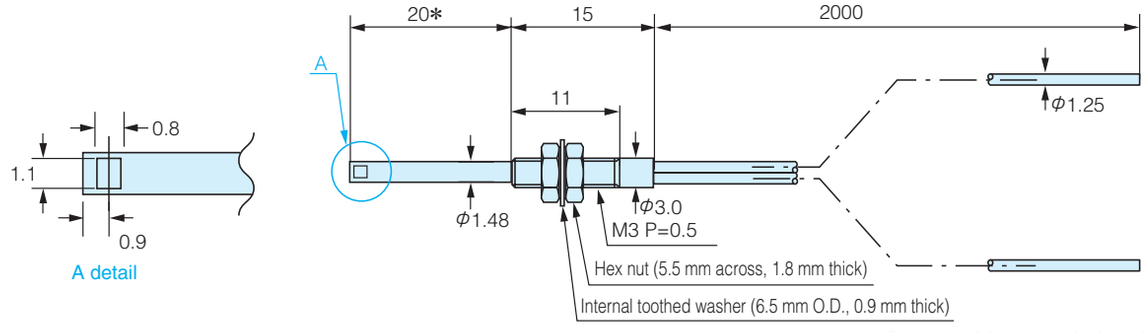
Detecting distances for individual amplifier models (mm)



Fiber Optic Cables

MODEL	FRSV8BC	Side-view ϕ1.48 head, 20 mm SS tube with M3 screw	Search ID No. 84
Detection method	Reflective		

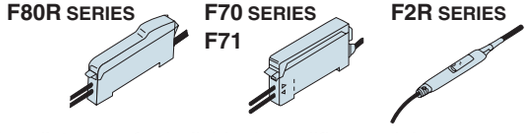
CAD



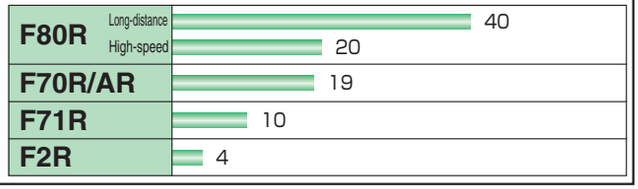
Do not bend the part marked with *.
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FRSV8BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.5
Allowable bending radius		R15
Standard detection object diameter		25 x 25mm white drawing paper (with F70R)
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier

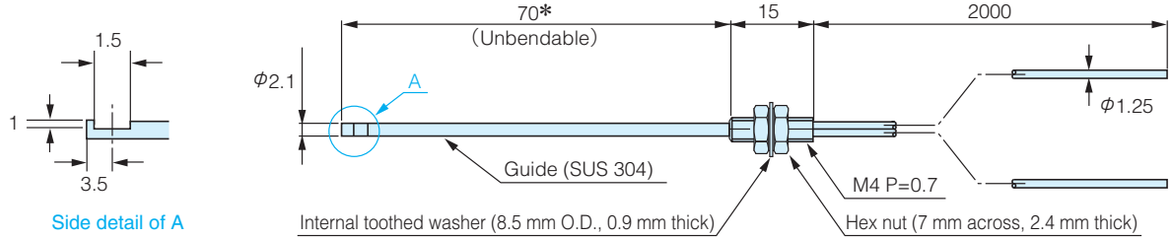


Detecting distances for individual amplifier models (mm)



MODEL	FRSV84BC	M4 screw SS 70 mm	Search ID No. 85
Detection method	Reflective		

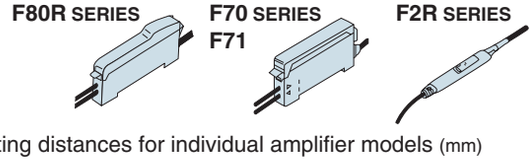
CAD



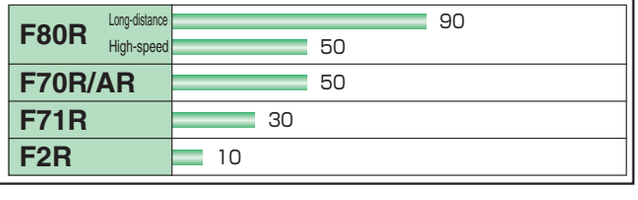
Do not bend the part marked with *.
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FRSV84BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.75
Allowable bending radius		R20
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier

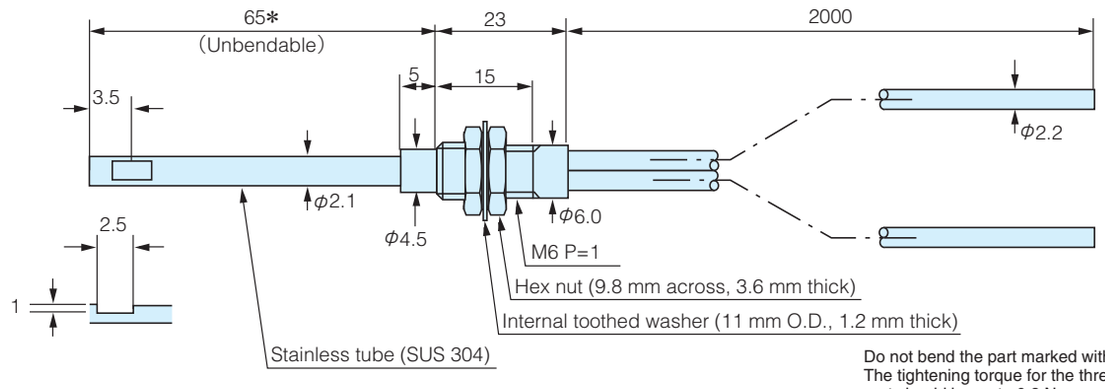


Detecting distances for individual amplifier models (mm)



MODEL	FRSV5BC	φ2.1 head, 65 mm SS tube with M6 screw	Search ID No. 86
Detection method	Reflective		

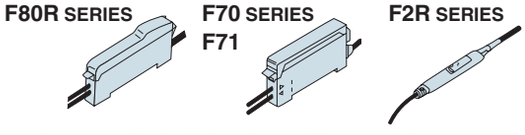
CAD



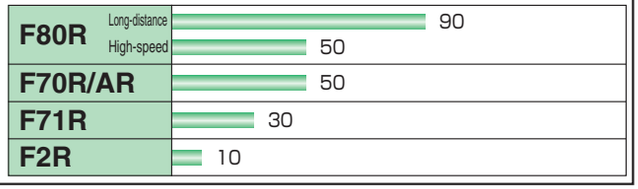
Do not bend the part marked with *.
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FRSV5BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	0.75
Allowable bending radius		R30
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

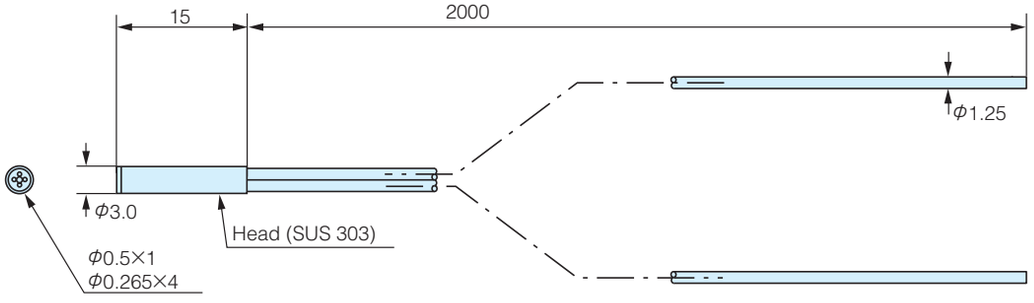


Detecting distances for individual amplifier models (mm)



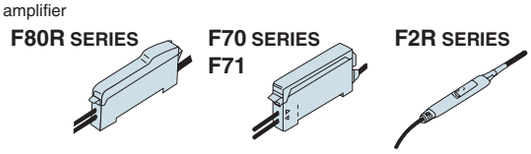
MODEL	FX83BC	Coaxial with 1 transmitting and 4 receiving fibers with φ3 unthreaded head-unit	Search ID No. 87
Detection method	Coaxial reflective		

CAD

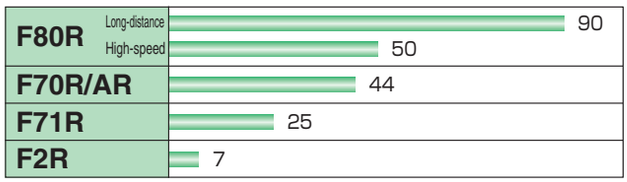


Model		FX83BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	φ0.5 x 1 (transmission)/φ0.265 x 4 (receptopn)
Allowable bending radius		R15
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier



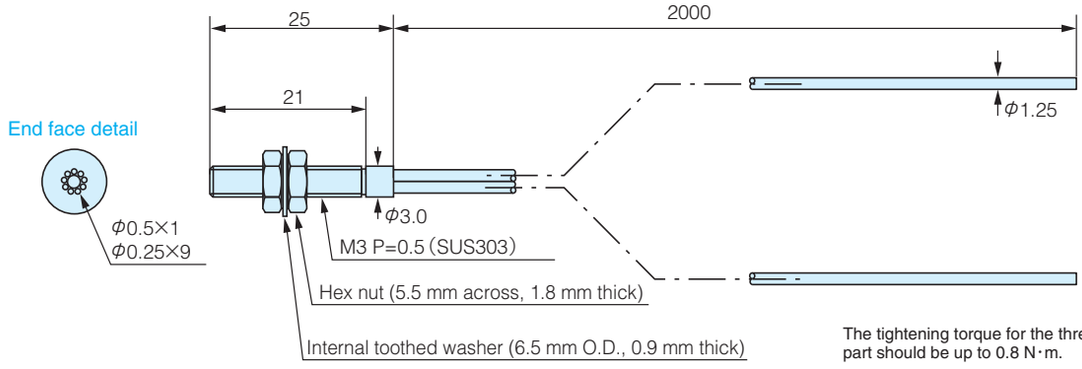
Detecting distances for individual amplifier models (mm)



Fiber Optic Cables

MODEL	FX801BC	Coaxial with 1 transmitting and 9 receiving fibers with M3 screw	Search ID No.	88
Detection method	Coaxial reflective			

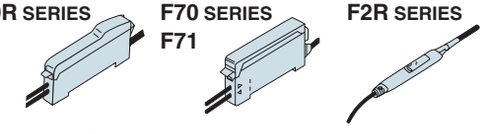
CAD



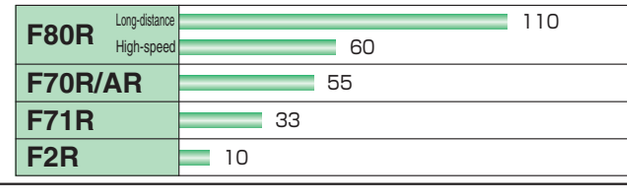
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FX801BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	φ0.5 (transmission) / φ0.25 x 9 (reception)
Allowable bending radius		R15
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

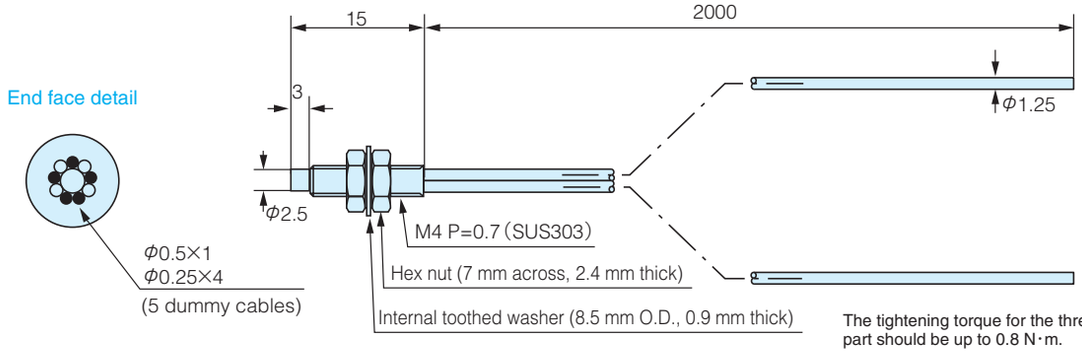


Detecting distances for individual amplifier models (mm)



MODEL	FX84BC	φ2.5mm coaxial cable with 1 transmitting and 4 receiving fibers with M4 screw	Search ID No.	89
Detection method	Coaxial reflective			

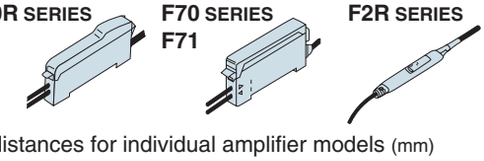
CAD



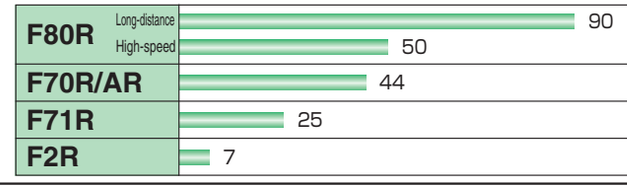
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FX84BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	φ0.5 x 1 (transmission) / φ0.25 x 4 (reception)
Allowable bending radius		R15
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

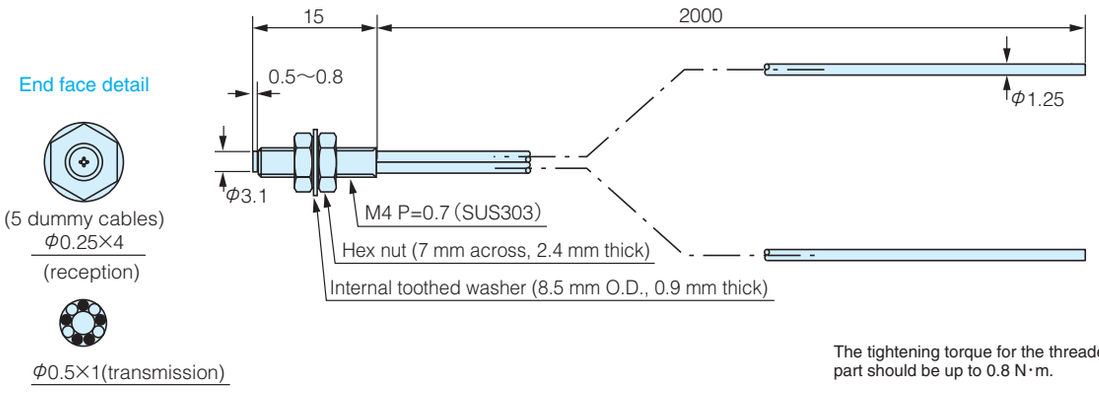


Detecting distances for individual amplifier models (mm)



MODEL	FX8401BC	Coaxial cable minute light spot with lens	Search ID No.	90
Detection method	Coaxial reflective			

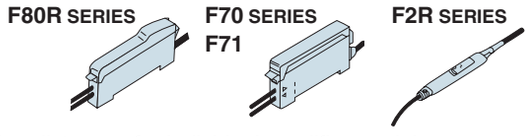
CAD



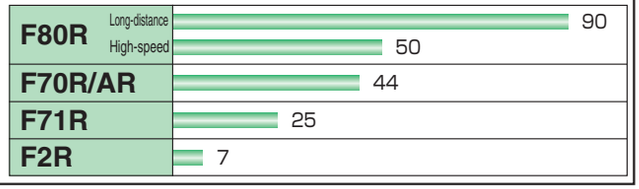
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FX8401BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	φ0.5 x 1 (transmission) / φ0.25 x 4 (reception)
Allowable bending radius		R15
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

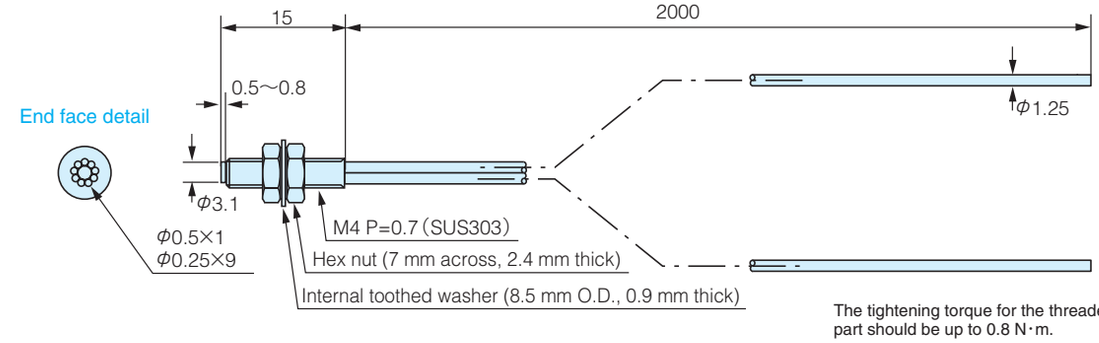


Detecting distances for individual amplifier models (mm)



MODEL	FX8404BC	Coaxial cable with 1 transmitting and 9 receiving fibers with M4 screw	Search ID No.	91
Detection method	Coaxial reflective			

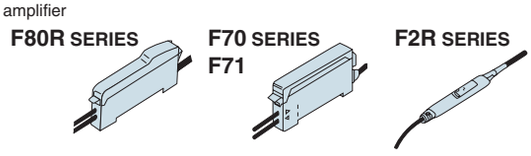
CAD



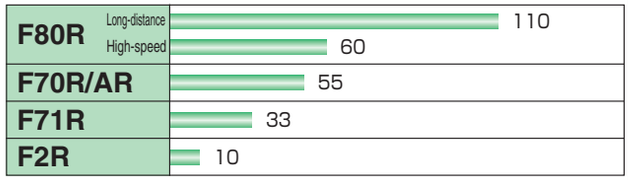
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FX8404BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	φ0.5 x 1 (transmission) / φ0.25 x 9 (reception)
Allowable bending radius		R15
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier



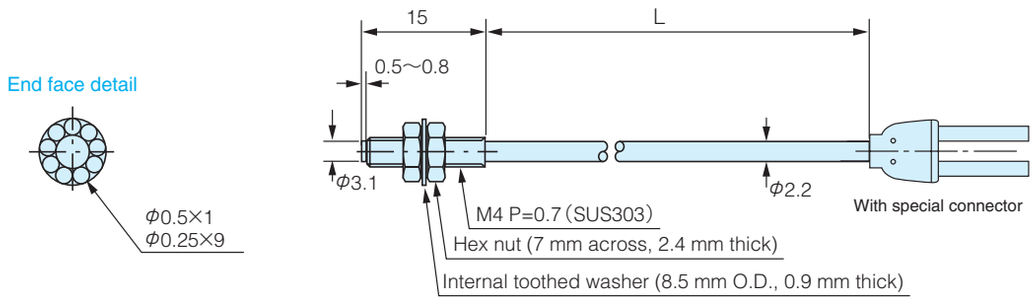
Detecting distances for individual amplifier models (mm)



Fiber Optic Cables

MODEL	**FX200J series**	Coaxial cable with 1 transmitting and 9 receiving fibers with M4 screw	Search ID No.	**92**
Detection method	Coaxial reflective			

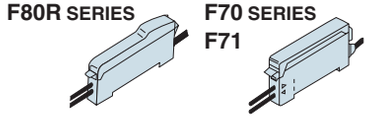
CAD



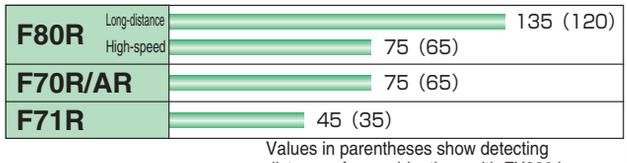
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FX205J	FX210J	FX220J
Fiber optic cable length(m)		0.5	1	2
Ambient temperature		– 30 ~ + 70 ºC		
Material	Covering	Polyethylene		
	Core	Plastic		
Diameter	Cable	2.2		
	Core	φ0.5 x 1 (transmission) / φ0.25 x 9 (reception)		
Allowable bending radius		R30		
Standard detection object diameter		100 x 100mm white drawing paper (with F70R)		
Smallest allowable detection object diameter		φ0.015 (excluding F71R)		

Applicable amplifier



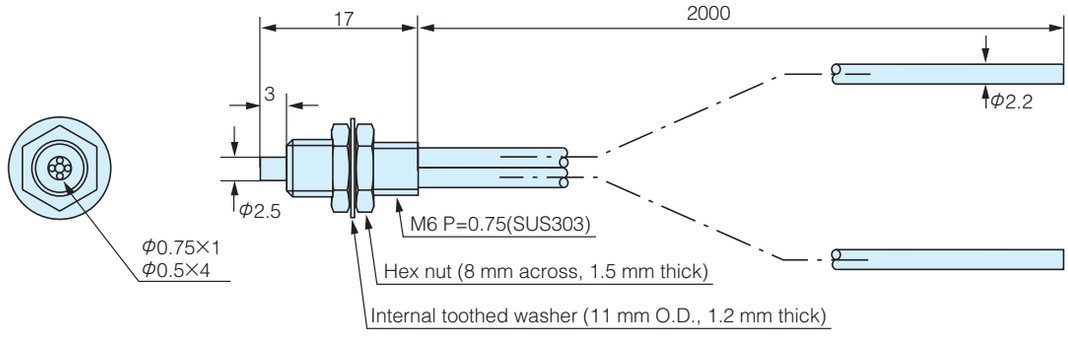
Detecting distances for individual amplifier models (mm)



Values in parentheses show detecting distances for combinations with FX220J.

MODEL	**FX7BC**	Lowest-cost φ2.5 coaxial cable with 1 transmitting and 4 receiving fiber optic cables with M6 screw	Search ID No.	**93**
Detection method	Coaxial reflective			

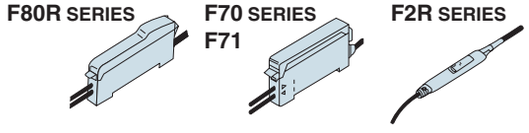
CAD



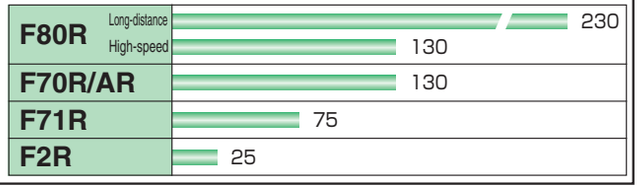
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FX7BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	φ0.75 x 1 (transmission) / φ0.5 x 4 (reception)
Allowable bending radius		R30
Standard detection object diameter		200 x 200mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

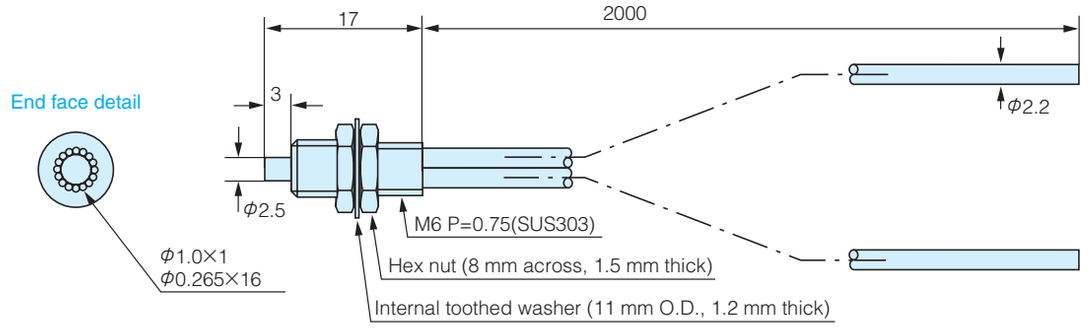


Detecting distances for individual amplifier models (mm)



MODEL	FX716BC	Coaxial cable with longest detecting distance	Search ID No.	94
Detection method	Coaxial reflective			

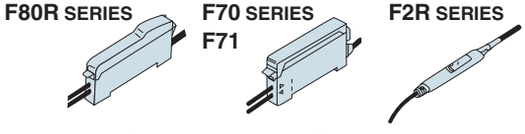
CAD



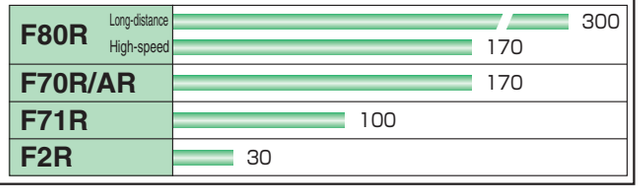
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FX716BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	φ1.0 x 1 (transmission) / φ0.265 x 16 (reception)
Allowable bending radius		R30
Standard detection object diameter		200 x 200mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

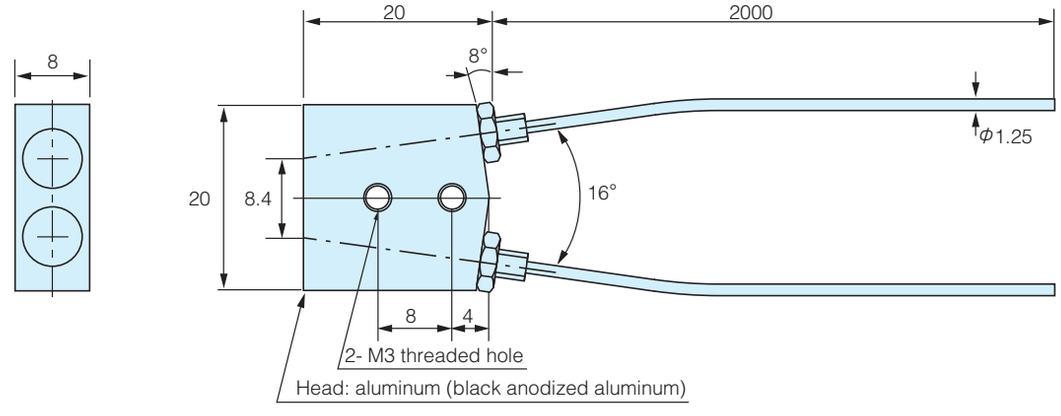


Detecting distances for individual amplifier models (mm)



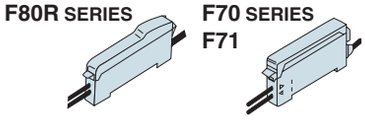
MODEL	FZ801BC	Detection regardless of detected object color	Search ID No.	95
Detection method	Limited reflection			

CAD

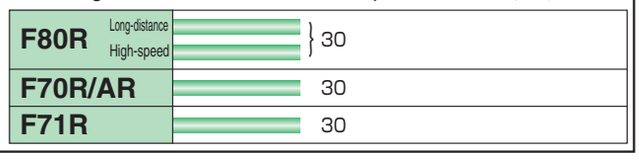


Model		FZ801BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	1.0
Allowable bending radius		R30
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R)

Applicable amplifier



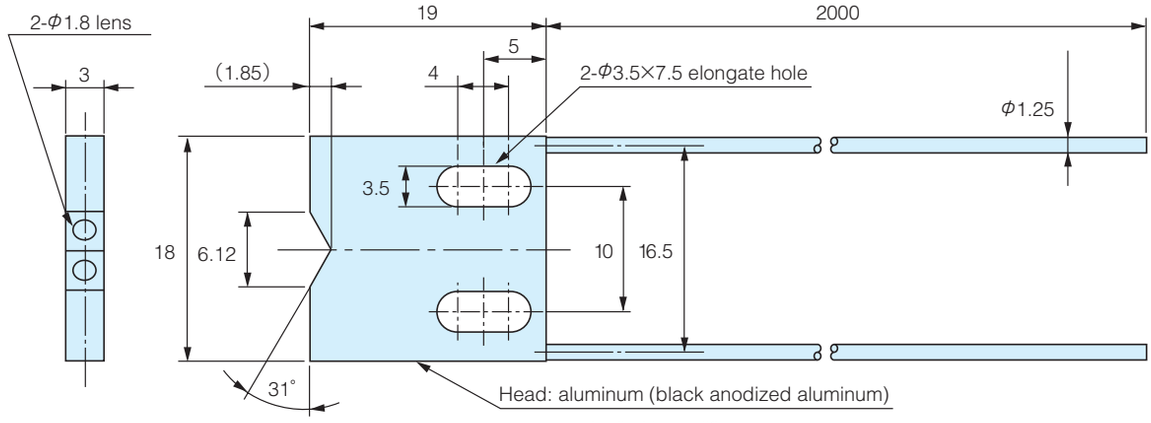
Detecting distances for individual amplifier models (mm)



Fiber Optic Cables

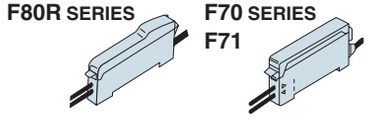
MODEL	FZ802BC	Thin body of 3 mm	Search ID No. 96
Detection method	Limited reflection		

CAD



Model		FZ802BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.5
Allowable bending radius		R15
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R)

Applicable amplifier

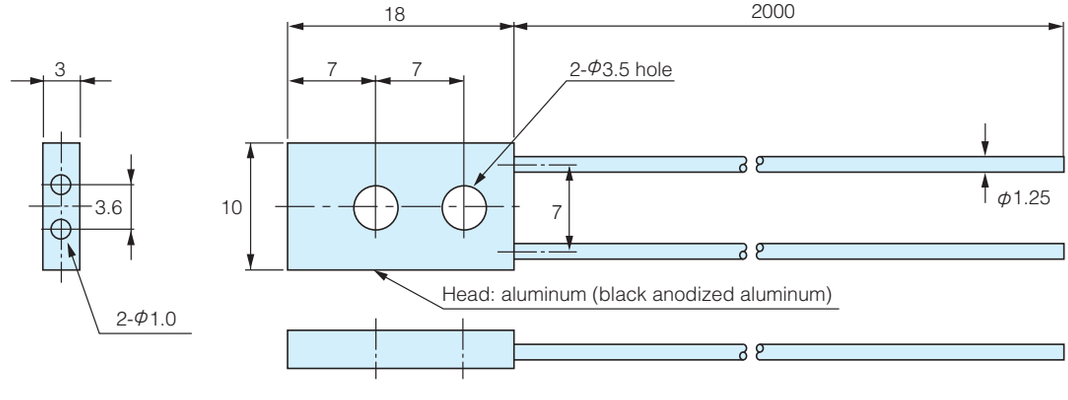


Detecting distances for individual amplifier models (mm)

F80R	Long-distance / High-speed	0~5
F70R/AR		0~5
F71R		0~5

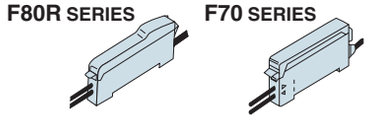
MODEL	FZ804BC	Thin body of 3 mm	Search ID No. 97
Detection method	Limited reflection		

CAD



Model		FZ804BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.5
Allowable bending radius		R15
Standard detection object diameter		50 x 50mm transparent glass plate (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R)

Applicable amplifier

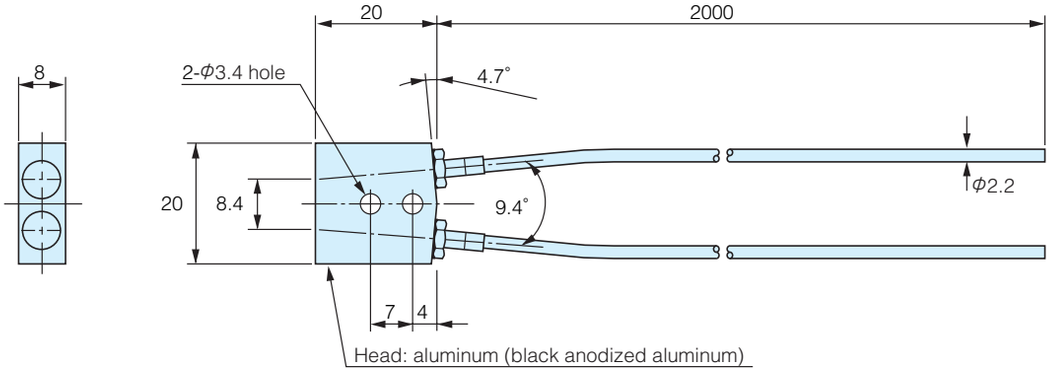


Detecting distances for individual amplifier models (mm)

F80R	Long-distance / High-speed	5~17
F70R/AR		5~17

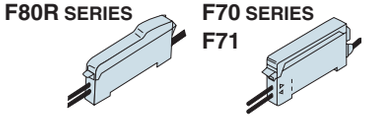
MODEL	FZ1901YBC	Limited reflection, allowable bending radius 1.0 mm	Search ID No.	98
Detection method	Limited reflection			

CAD



Model		FZ1901YBC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0 (multi-core)
Allowable bending radius		R1
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R)

Applicable amplifier

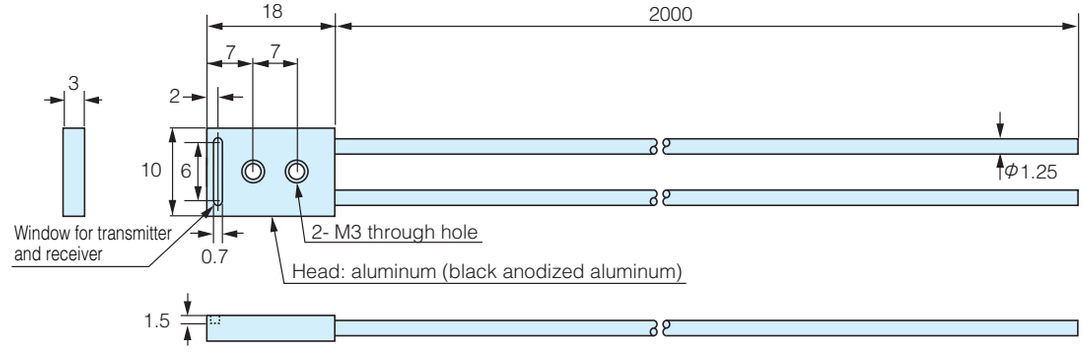


Detecting distances for individual amplifier models (mm)

F80R	Long-distance / High-speed	50
F70R/AR		50
F71R		50

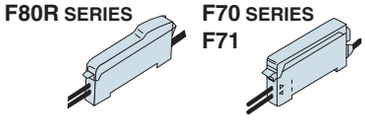
MODEL	FZV8301BC	Ideal for fitting into robot hand with a depth of only 3 mm	Search ID No.	99
Detection method	Limited reflection			

CAD



Model		FZV8301BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.75
Allowable bending radius		R20
Standard detection object diameter		50 x 50mm transparent glass plate (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R)

Applicable amplifier



Detecting distances for individual amplifier models (mm)

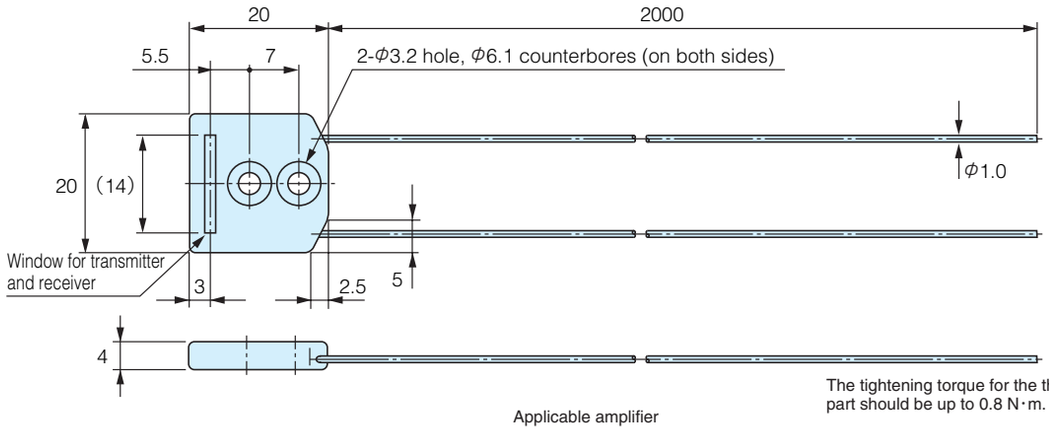
F80R	Long-distance / High-speed	0~20
F70R/AR		0~20
F71R		0~20

Use at a lower sensitivity for combination with F80R or F70R/AR.

Fiber Optic Cables

MODEL	FZV191YBC	Ideal for glass substrate detection with allowable bending radius of only 1 mm	Search ID No. 100
Detection method	Limited reflection		

CAD

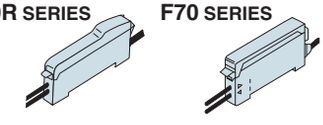


The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FZV191YBC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.0
	Core	0.75 (multi-core)
Allowable bending radius		R1
Standard detection object diameter		Transparent glass plate
Smallest allowable detection object diameter		–

Applicable amplifier

F80R SERIES F70 SERIES



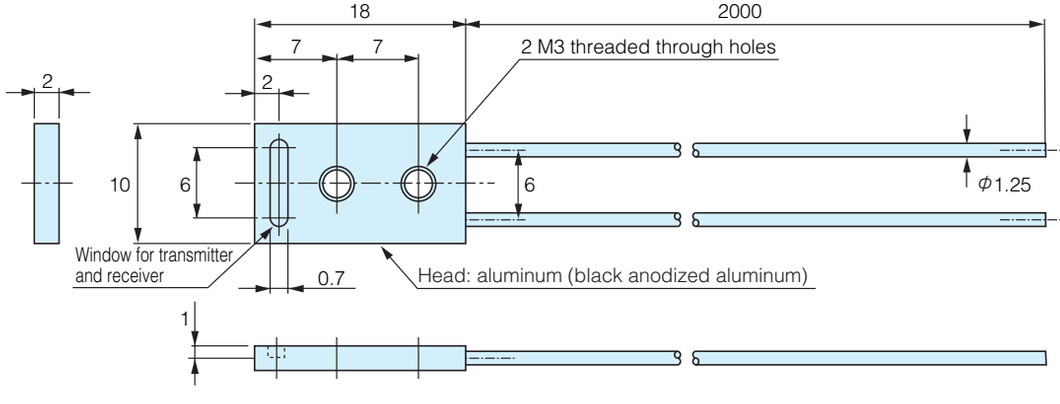
Detecting distances for individual amplifier models (mm)

F80R	Long-distance, High-speed	0~6
F70R/AR		0~6

The sensor may be activated even without detection objects when the amplifier sensitivity is too high. Be sure to adjust the sensitivity before use.

MODEL	FZV8203BC	2-mm thin body	Search ID No. 101
Detection method	Limited reflection		

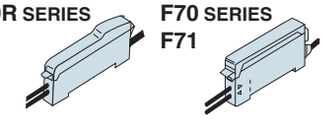
CAD



Model		FZV8203BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	1.0
Allowable bending radius		R30
Standard detection object diameter		50 x 50mm transparent glass plate (with F70R)
Smallest allowable detection object diameter		Φ0.015 (excluding F71R)

Applicable amplifier

F80R SERIES F70 SERIES F71

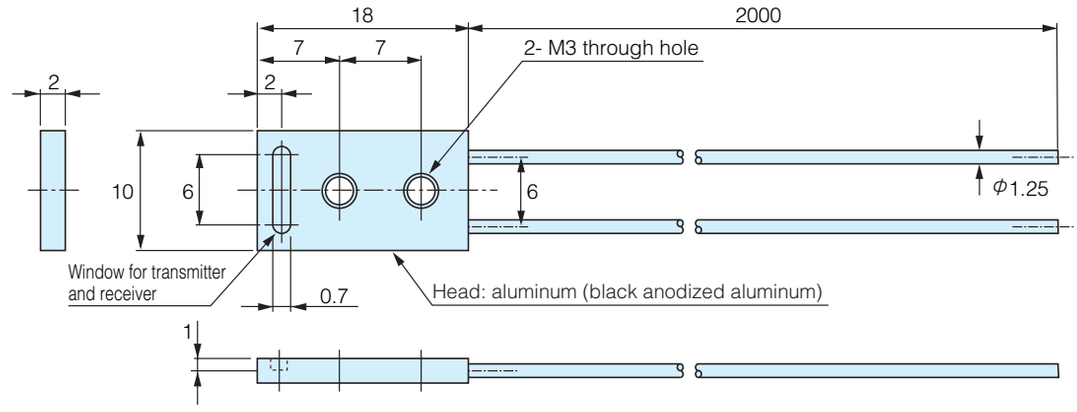


Detecting distances for individual amplifier models (mm)

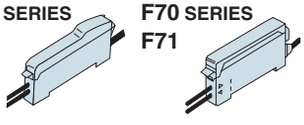
F80R	Long-distance, High-speed	0~19
F70R/AR		0~19
F71R		0~19

MODEL	FZV8202BC	2-mm thin body	Search ID No. 102
Detection method	Limited reflection		

CAD



Applicable amplifier



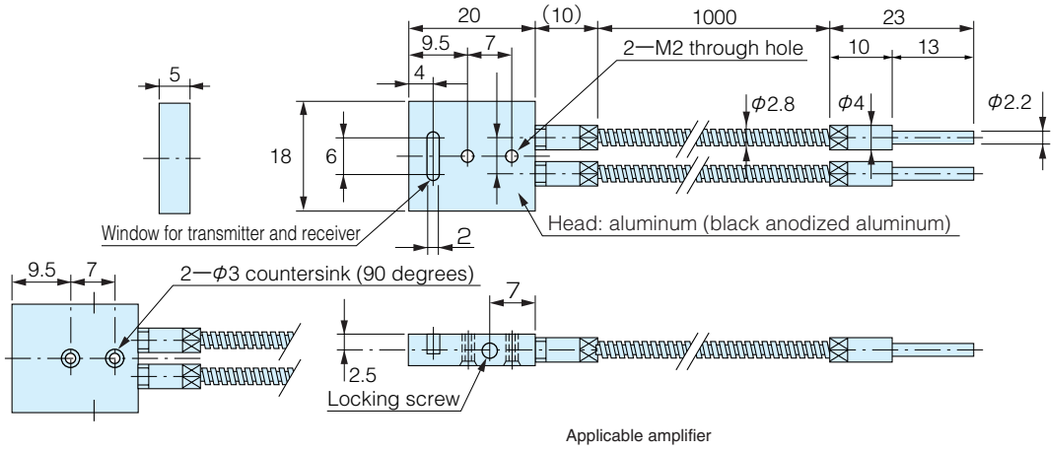
Model		FZV8202BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.5
Allowable bending radius		R15
Standard detection object diameter		50 x 50mm transparent glass plate (with F70R)
Smallest allowable detection object diameter		φ0.06 (excluding F71R)

Detecting distances for individual amplifier models (mm)

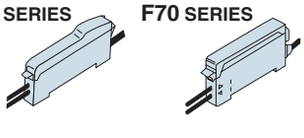
F80R	Long-distance, High-speed	0~5
F70R/AR		0~5
F71R		0~5

MODEL	GXZV505BJ	Heat resistance to 250 ºC	Search ID No. 103
Detection method	Reflective		

CAD



Applicable amplifier



Model		GXZV505BJ
Fiber optic cable length(m)		1
Ambient temperature		– 30 ~ + 250 ºC
Material	Covering	SUS spiral
	Core	Glass
Diameter	Cable	2.8
	Core	Binding diameter: 1.1 mm
Allowable bending radius		R25
Standard detection object diameter		Transparent glass plate: t = 0.5, 50 x 50mm (with F70R)
Smallest allowable detection object diameter		–

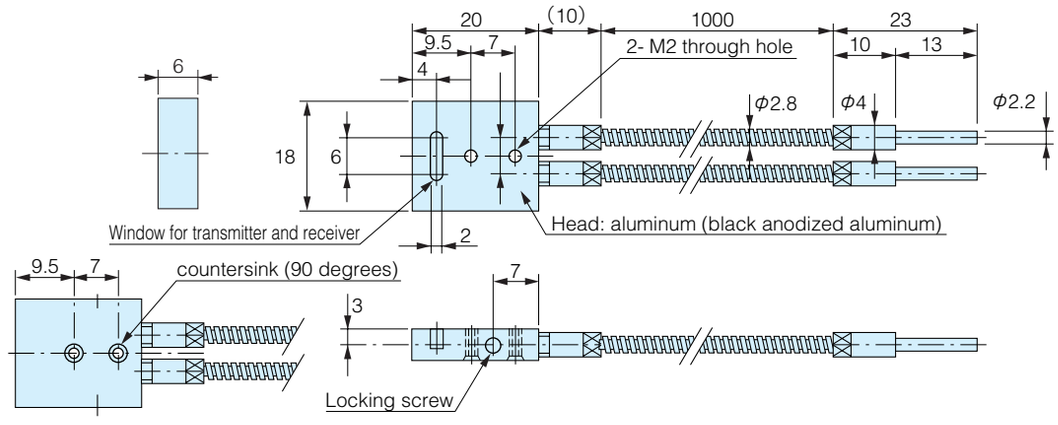
Detecting distances for individual amplifier models (mm)

F80R	Long-distance, High-speed	0~5
F70R/AR		0~5

Fiber Optic Cables

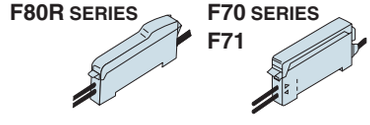
MODEL	GXZV605BJ	Heat resistance to 250 ºC	Search ID No. 104
Detection method	Reflective		

CAD



Model		GXZV605BJ
Fiber optic cable length(m)		1
Ambient temperature		– 30 ~ + 250 ºC
Material	Covering	SUS spiral
	Core	Glass
Diameter	Cable	2.8
	Core	Binding diameter: 1.1 mm
Allowable bending radius		R25
Standard detection object diameter		50 x 50mm transparent glass plate (with F70R)
Smallest allowable detection object diameter		–

Applicable amplifier

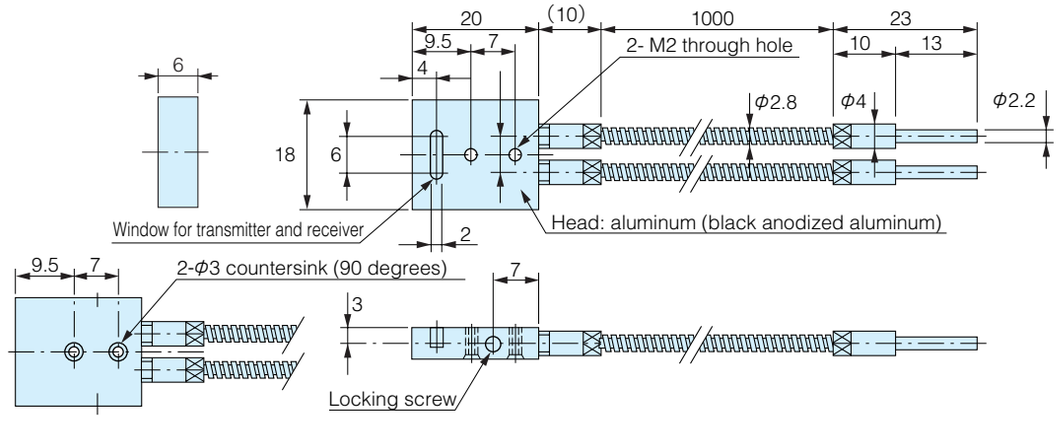


Detecting distances for individual amplifier models (mm)

F80R	Long-distance, High-speed	0~5
F70R/AR		0~5
F71R		0~5

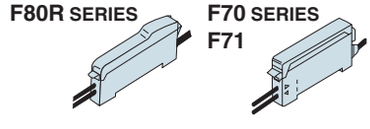
MODEL	GXZV612BJ	Heat resistance to 250 ºC	Search ID No. 105
Detection method	Reflective		

CAD



Model		GXZV612BJ
Fiber optic cable length(m)		1
Ambient temperature		– 30 ~ + 250 ºC
Material	Covering	SUS spiral
	Core	Glass
Diameter	Cable	2.8
	Core	Binding diameter: 1.1 mm
Allowable bending radius		R25
Standard detection object diameter		50 x 50mm transparent glass plate (with F70R)
Smallest allowable detection object diameter		–

Applicable amplifier

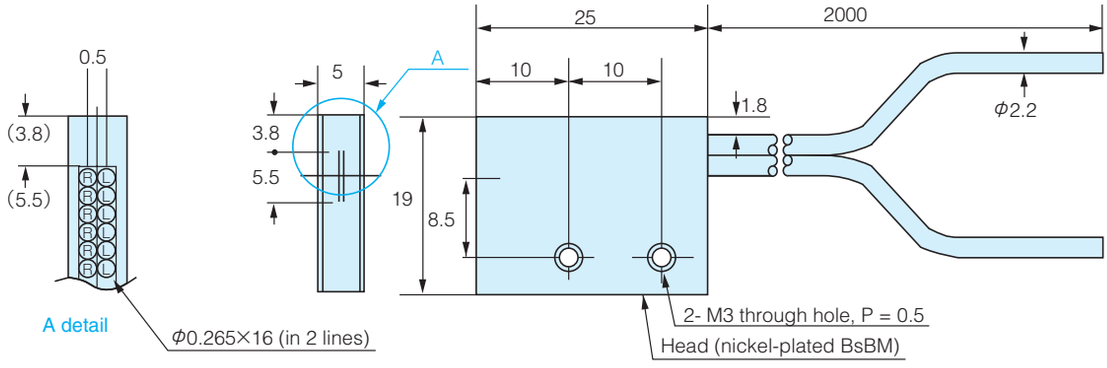


Detecting distances for individual amplifier models (mm)

F80R	Long-distance, High-speed	1~12
F70R/AR		1~12
F71R		1~12

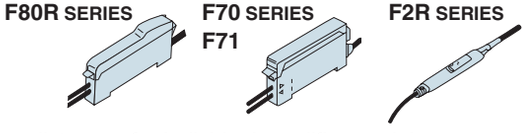
MODEL	FRL7W16BC	Wide-area “head-on” model with 5.5-mm detecting width	Search ID No. 106
Detection method	Reflective		

CAD

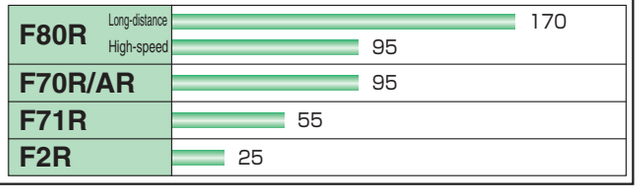


Model		FRL7W16BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	0.265 x 16, in 2 lines
Allowable bending radius		R30
Standard detection object diameter		100 x 100mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

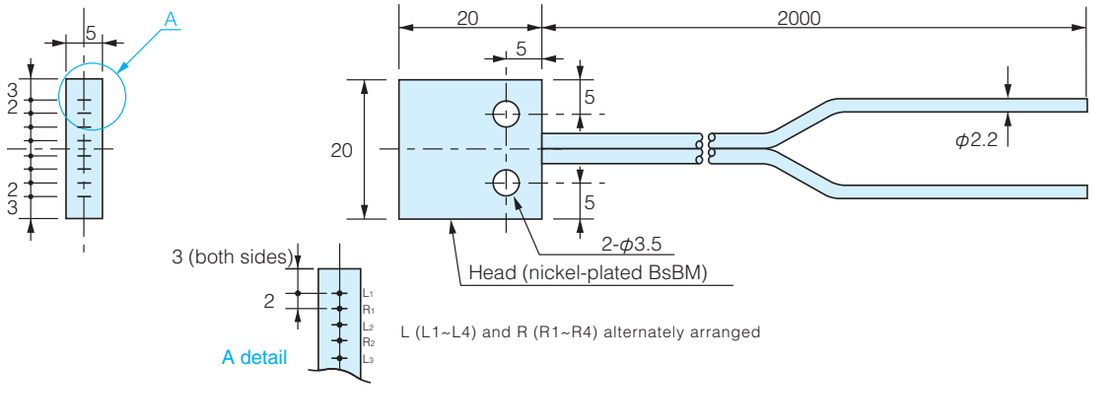


Detecting distances for individual amplifier models (mm)



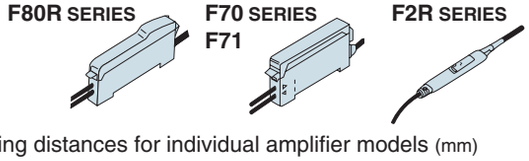
MODEL	FRL78BC	Detecting width of 14 mm	Search ID No. 107
Detection method	Reflective		

CAD

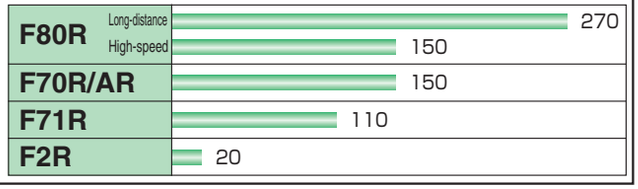


Model		FRL78BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	0.5 x 4, 2??
Allowable bending radius		R30
Standard detection object diameter		200 x 200mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.3 (excluding F71R, F2R)

Applicable amplifier

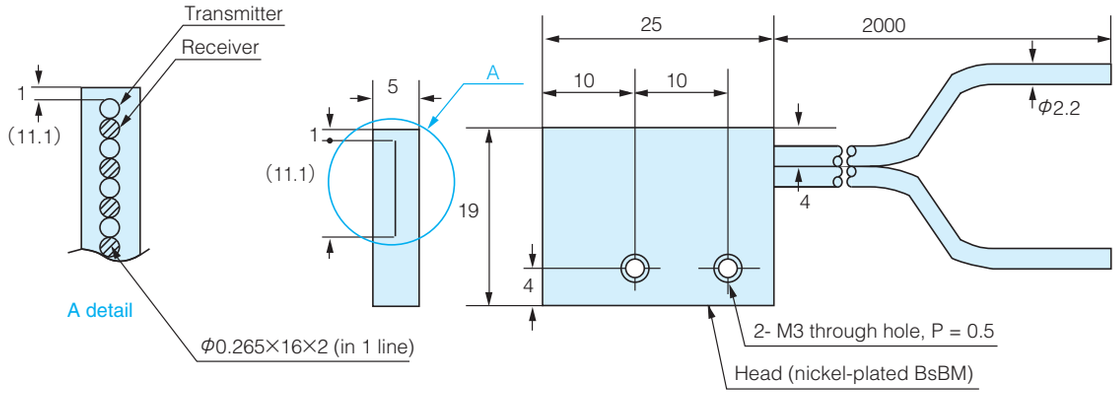


Detecting distances for individual amplifier models (mm)



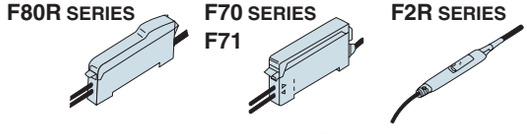
MODEL	FRL732BC	Wide-area “head-on” model with 11.1-mm detecting width	Search ID No. 108
Detection method	Reflective		

CAD

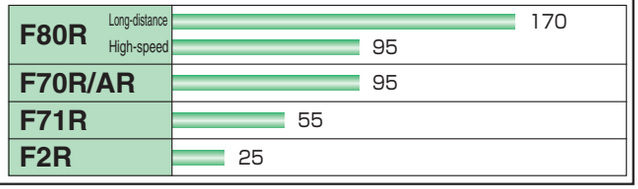


Model		FRL732BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	0.265 x 16
Allowable bending radius		R30
Standard detection object diameter		100 x 100mm white drawing paper (with F70R)
Smallest allowable detection object diameter		Φ0.015 (excluding F71R, F2R)

Applicable amplifier

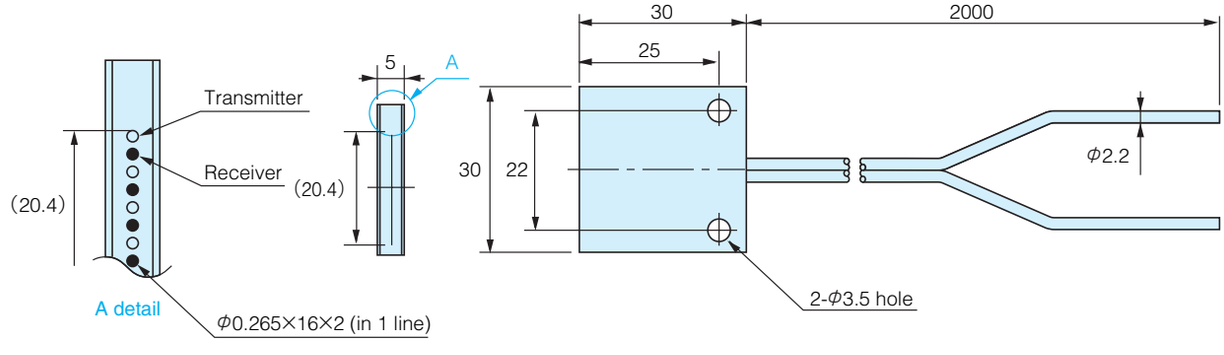


Detecting distances for individual amplifier models (mm)



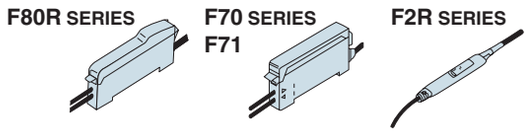
MODEL	FRL702BC	Detecting width of 20.4 mm	Search ID No. 109
Detection method	Reflective		

CAD

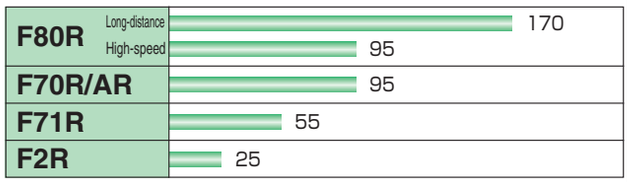


Model		FRL702BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	0.265 x 16 I 2
Allowable bending radius		R30
Standard detection object diameter		100 x 100mm white drawing paper (with F70R)
Smallest allowable detection object diameter		Φ0.015 (excluding F71R, F2R)

Applicable amplifier

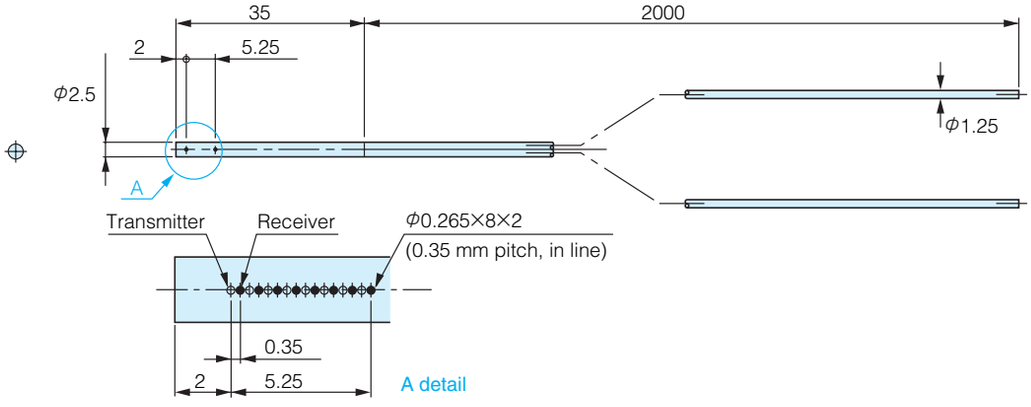


Detecting distances for individual amplifier models (mm)



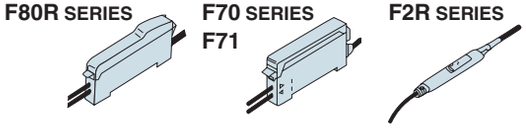
MODEL	FRLV816BC	Cylindrical “wide-area” model with 5.25-mm detecting width	Search ID No. 110
Detection method	Reflective		

CAD

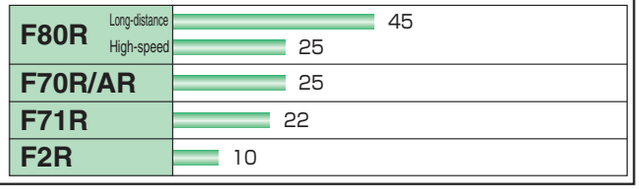


Model		FRLV816BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.265 x 8 I 2
Allowable bending radius		R15
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

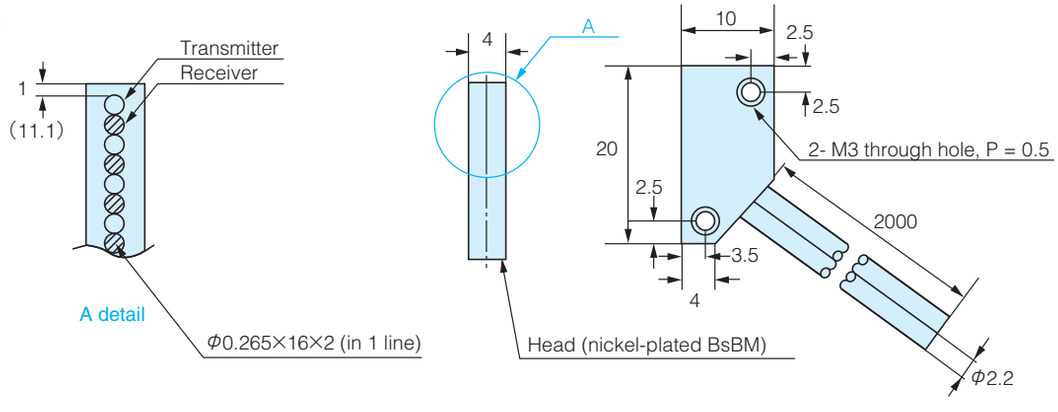


Detecting distances for individual amplifier models (mm)



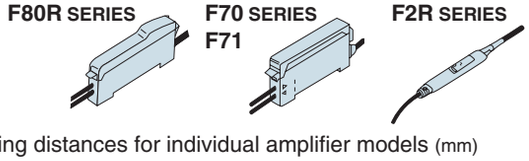
MODEL	FRLV732BC	Side-on model with 11.1-mm detecting width	Search ID No. 111
Detection method	Reflective		

CAD

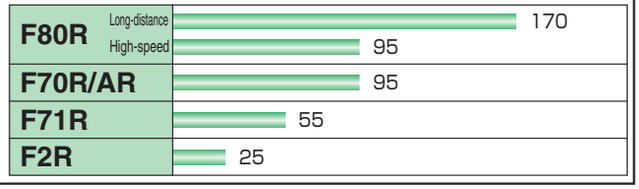


Model		FRLV732BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	0.265 x 16
Allowable bending radius		R4
Standard detection object diameter		100 x 100mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier



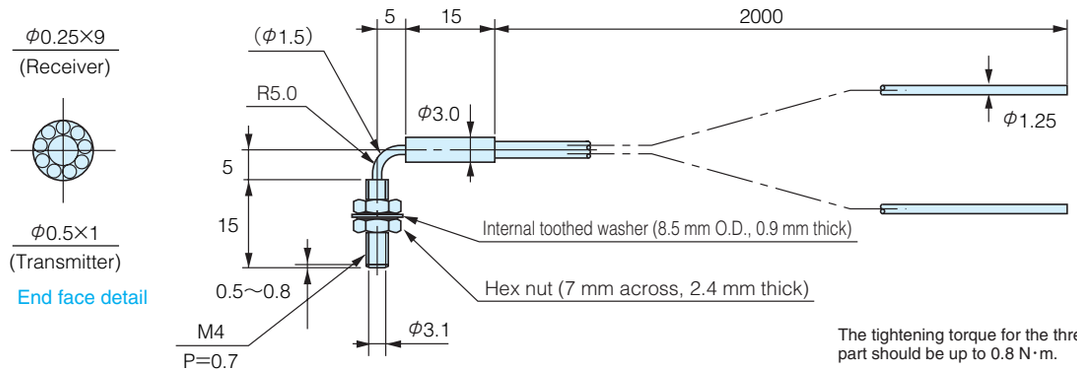
Detecting distances for individual amplifier models (mm)



Fiber Optic Cables

MODEL	FX8403BC	M4 screw reflective model	Search ID No. 112
Detection method	Coaxial reflective		

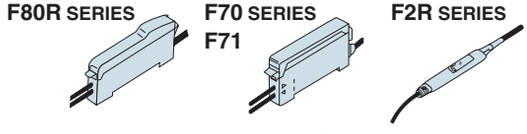
CAD



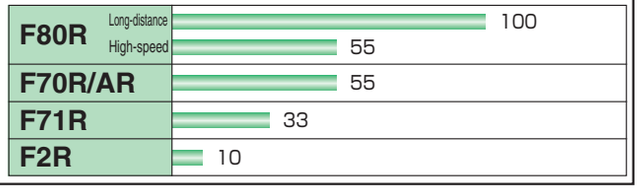
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		FX8403BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	1.25
	Core	0.5 x 1 (transmission) / 0.25 x 9 (reception)
Allowable bending radius		R15
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

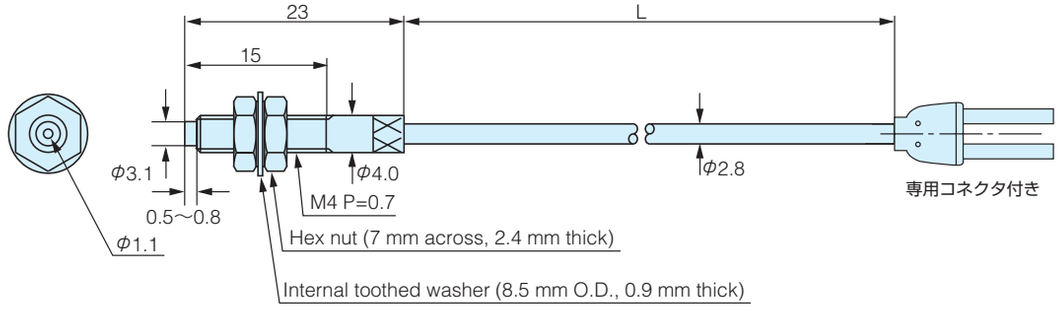


Detecting distances for individual amplifier models (mm)



MODEL	GLX500J series	Heat resistance to 200 ºC, covered with fluoroplastic tube	Search ID No. 113
Detection method	Reflective		

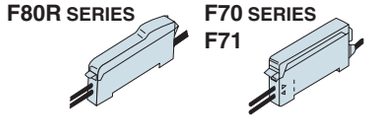
CAD



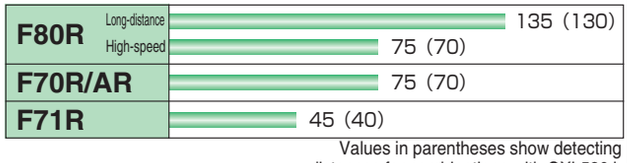
The tightening torque for the threaded part should be up to 0.8 N·m.

Model		GLX505J	GLX510J	GLX520J
Fiber optic cable length(m)		0.5	1	2
Ambient temperature		Tip: – 60 ~ +200 ºC / Covering: 200 ºC		
Material	Covering	Fluoroplastic		
	Core	Glass		
Diameter	Cable	2.2		
	Core	Binding diameter: 1.1 (2-section)		
Allowable bending radius		R25		
Standard detection object diameter		100 x 100mm white drawing paper (with F70R)		
Smallest allowable detection object diameter		φ0.015 (excluding F71R)		

Applicable amplifier



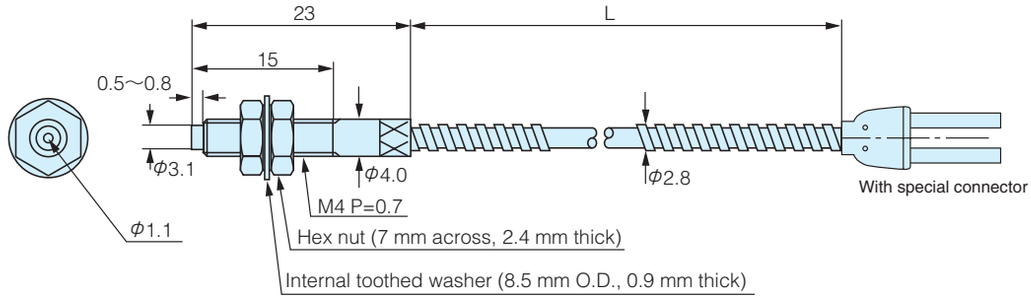
Detecting distances for individual amplifier models (mm)



Values in parentheses show detecting distances for combinations with GXL520J.

MODEL	GXH500J series	Heat resistance to 350 ºC, covered with SS spiral tube	Search ID No. 114
Detection method	Reflective		

CAD

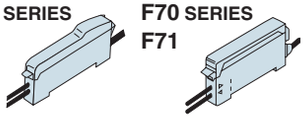


The tightening torque for the threaded part should be up to 0.8 N·m.

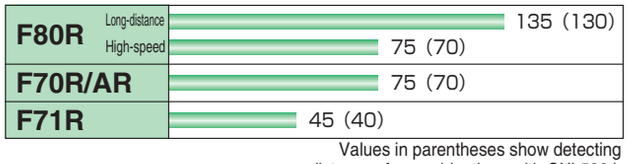
Model		GXH505J	GXH510J	GXH520J
Fiber optic cable length(m)		0.5	1	2
Ambient temperature		– 60 ~ + 350 ºC		
Material	Covering	SUS spiral		
	Core	Glass		
Diameter	Cable	2.8		
	Core	Binding diameter: 1.1 (2-section)		
Allowable bending radius		R25		
Standard detection object diameter		100 x 100mm white drawing paper (with F70R)		
Smallest allowable detection object diameter		φ0.015 (excluding F71R)		

Applicable amplifier

F80R SERIES F70 SERIES F71



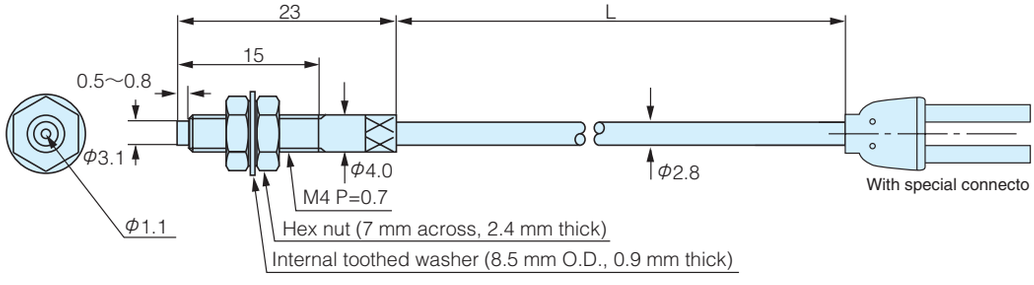
Detecting distances for individual amplifier models (mm)



Values in parentheses show detecting distances for combinations with GXL520J.

MODEL	GX500J series	Heat resistance to 230 ºC, M4 screw	Search ID No. 115
Detection method	Reflective		

CAD

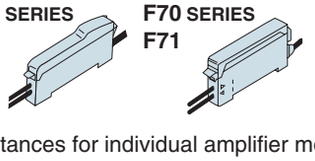


The tightening torque for the threaded part should be up to 0.8 N·m.

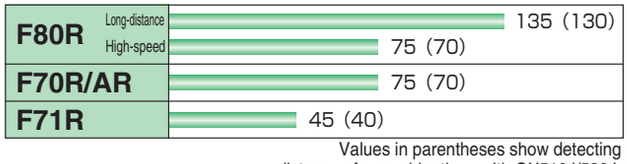
Model		GX505J	GX510J	GX520J
Fiber optic cable length(m)		0.5	1	2
Ambient temperature		Tip: – 60 ~ +230 ºC / Covering: 200 ºC		
Material	Covering	Silicon tube		
	Core	Glass		
Diameter	Cable	2.8		
	Core	Binding diameter: 1.1 (2-section)		
Allowable bending radius		R25		
Standard detection object diameter		100 x 100mm white drawing paper (with F70R)		
Smallest allowable detection object diameter		φ0.015 (excluding F71R)		

Applicable amplifier

F80R SERIES F70 SERIES F71



Detecting distances for individual amplifier models (mm)

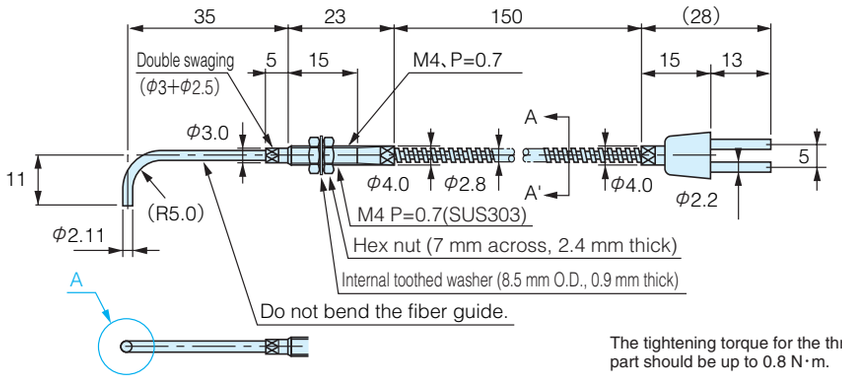


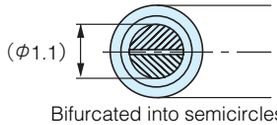
Values in parentheses show detecting distances for combinations with GX510J/520J.

Fiber Optic Cables

MODEL	GXSH5015J	M4 screw SS 40 mm, heat resistance to 350 ºC	Search ID No. 116
Detection method	Reflective		

CAD





Bifurcated into semicircles (orientation required)

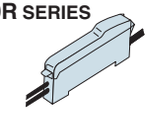
A end surface detail

The tightening torque for the threaded part should be up to 0.8 N·m.

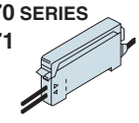
Model		GXSH5015J
Fiber optic cable length(m)		0.15
Ambient temperature		– 30 ~ + 350 ºC
Material	Covering	SUS spiral
	Core	Glass
Diameter	Cable	2.8
	Core	Binding diameter: 1.1
Allowable bending radius		R25
Standard detection object diameter		100 x 100mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R)

Applicable amplifier

F80R SERIES



F70 SERIES
F71

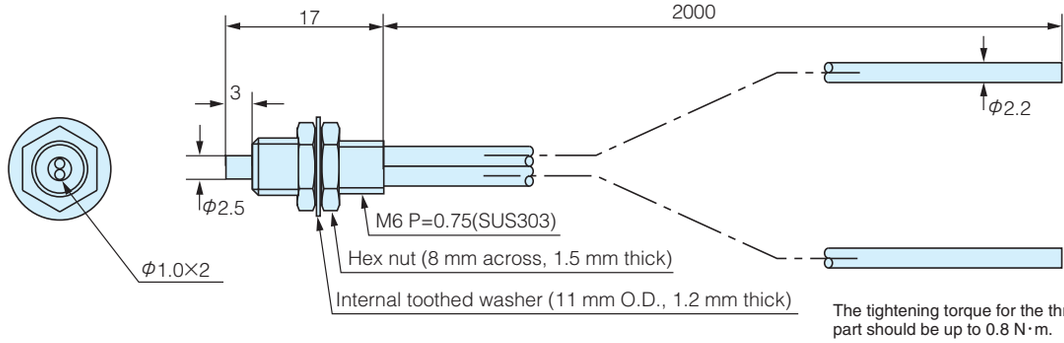


Detecting distances for individual amplifier models (mm)

F80R	Long-distance	90
	High-speed	50
F70R/AR		50
F71R		30

MODEL	FRH7BC	Lowest-cost heat-resistant fiber optic cable, heat resistance to 105 ºC	Search ID No. 117
Detection method	Reflective		

CAD

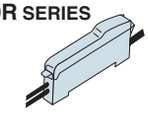


The tightening torque for the threaded part should be up to 0.8 N·m.

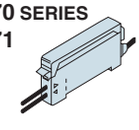
Model		FRH7BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 105 ºC
Material	Covering	Heat-resistant polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0
Allowable bending radius		R30
Standard detection object diameter		200 x 200mm white drawing paper (with F70R)
Smallest allowable detection object diameter		φ0.015 (excluding F71R, F2R)

Applicable amplifier

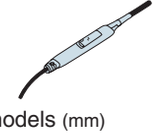
F80R SERIES



F70 SERIES
F71



F2R SERIES



Detecting distances for individual amplifier models (mm)

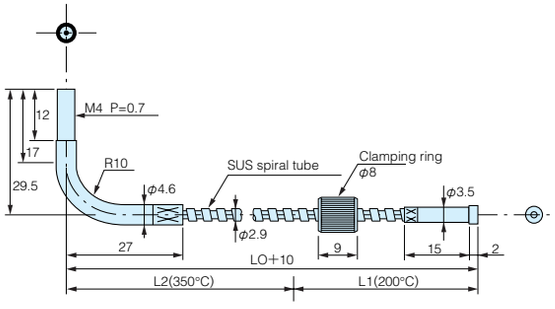
F80R	Long-distance	320
	High-speed	180
F70R/AR		180
F71R		100
F2R		35

MODEL	GTSH / GTH series	1 x 10^{-8} Pa vacuum-proof + heat-resistance to 350 ºC	Search ID No. 118
Detection method	Through-beam		

CAD

GTSH Series

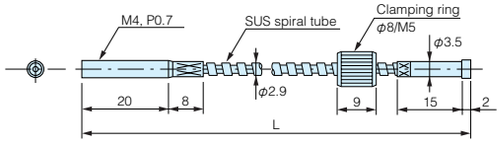
Type	L(mm)	L1(mm)	L2(mm)
GTSH705V	500	100	400
GTSH710V	1000	100	900



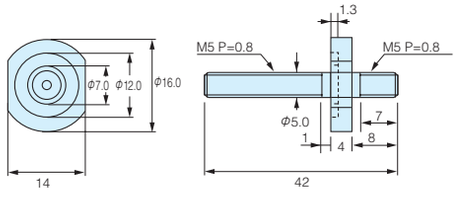
CAD

GTH Series

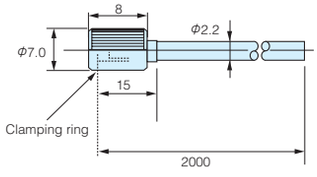
Type	L(mm)	L1(mm)	L2(mm)
GTH705V	500	300	200
GTH710V	1000	800	200



Light-introducing fiber pin (FA7VP-M5)

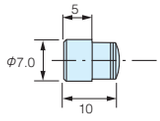


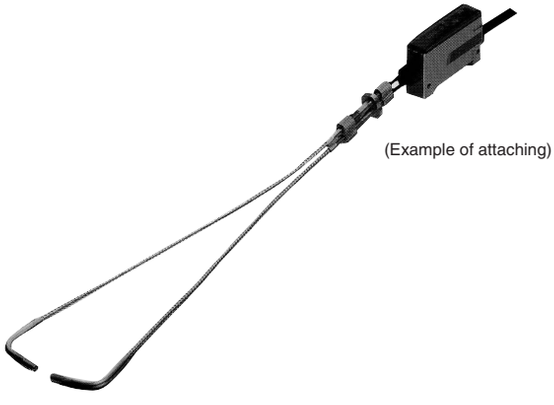
Atmosphere side fiber optic cable (FT7VBC-M5)



Lens unit (optional) FA514

CAD





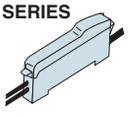
● Contact Takex for prices.

Specification

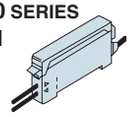
Name	Vacuum-proof heat-resistant fiber optic cable		Light-introducing fiber pin	Atmosphere side fiber optic cable
Model	GTH705V GTH710V	GTSH705V GTSH710V	FA7VP-M5	FT7VBC-M5
Detection method	Through-beam		—	—
Smallest allowable detection object	Copper wire of about φ1		—	—
Fiber diameter	1.2 mm (binding diameter)		φ1.5	φ1.5
Length	500mm, 1000mm		42mm	2 M (free-cutting)
Material	Glass (SUS spiral tube)		Glass rod	Plastic
Leakage	1 x 10-8Pa-m3/s(He)			—
Ambient temperature	– 60 ~ 350 ºC		– 30~230ºC	– 30~230ºC
Mass	40 g max.	50 g max.	40 g max.	25 g max.

Applicable amplifier

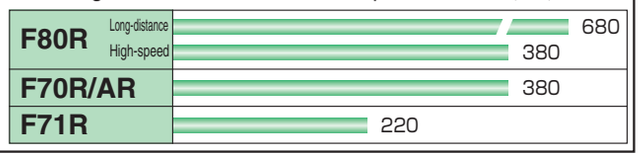
F80R SERIES



F70 SERIES
F71

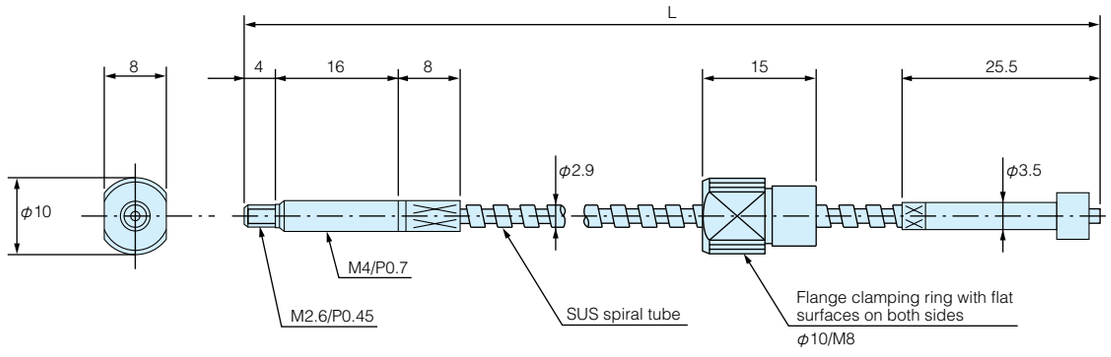


Detecting distances for individual amplifier models (mm)



MODEL	**GTHN600 series**	Vacuum-side through-beam M4 screw with M2.6 tip (for flange connection)	Search ID No.	119
Detection method	Through-beam			

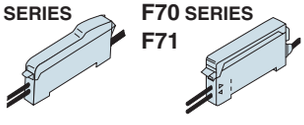
CAD



Model		GTHN605V	GTHN610V	GTHN615V	GTHN620V
Fiber optic cable length(m)		0.5	1	1.5	2
Ambient temperature		– 30 ~ + 350 ºC			
Material	Covering	SUS spiral			
	Core	Glass			
Diameter	Cable	2.9			
	Core	Binding diameter: 1.5			
Allowable bending radius		R30			
Standard detection object diameter		ϕ1.2			
Smallest allowable detection object diameter		ϕ1.0			

Applicable amplifier

F80R SERIES **F70 SERIES** **F71**



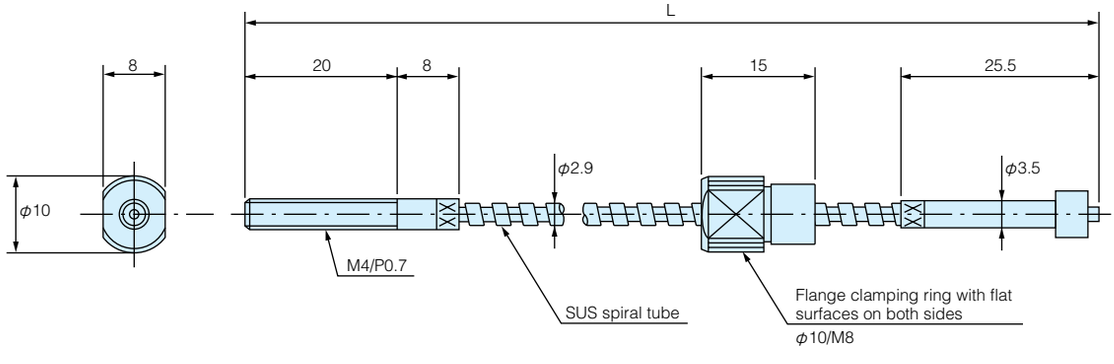
Detecting distances for individual amplifier models (mm)

F80R	Long-distance	480 (380)
	High-speed	270 (210)
F70R/AR		270 (210)
F71R		230 (170)

Values in parentheses show detecting distances for combinations with GTHN620V.

MODEL	**GTHN700 series**	Vacuum-side through-beam M4 screw (for flange connection)	Search ID No.	120
Detection method	Through-beam			

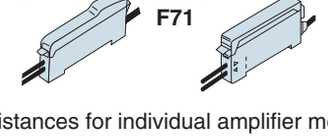
CAD



Model		GTHN705V	GTHN710V	GTHN715V	GTHN720V
Fiber optic cable length(m)		0.5	1	1.5	2
Ambient temperature		– 30 ~ + 350 ºC			
Material	Covering	SUS spiral			
	Core	Glass			
Diameter	Cable	2.9			
	Core	Binding diameter: 1.5			
Allowable bending radius		R30			
Standard detection object diameter		ϕ1.2			
Smallest allowable detection object diameter		ϕ1.0			

Applicable amplifier

F80R SERIES **F70 SERIES** **F71**



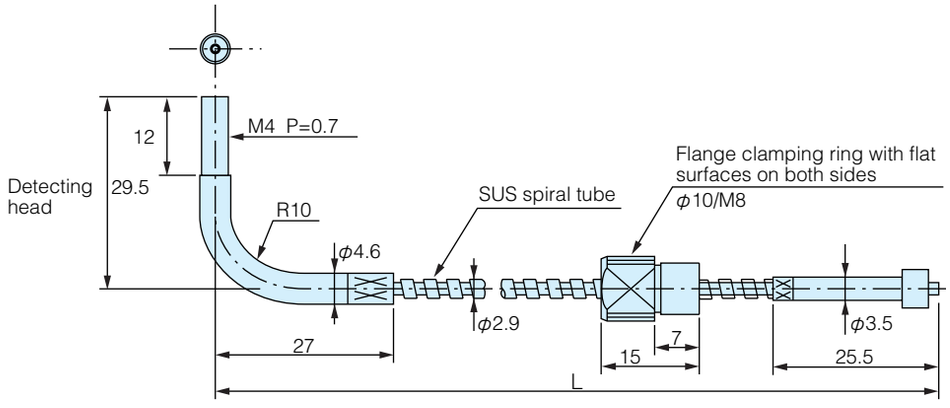
Detecting distances for individual amplifier models (mm)

F80R	Long-distance	480 (380)
	High-speed	270 (210)
F70R/AR		270 (210)
F71R		230 (170)

Values in parentheses show detecting distances for combinations with GTHN720V.

MODEL	GTSHN700 series	Vacuum-side through-beam elbow with M4 screw (for flange connection)	Search ID No. 121
Detection method	Through-beam		

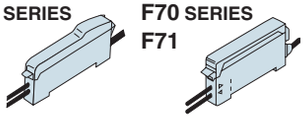
CAD



Model		GTSHN705V	GTSHN710V	GTSHN715V	GTSHN720V
Fiber optic cable length(m)		0.5	1	1.5	2
Ambient temperature		– 30 ~ + 350 ºC			
Material	Covering	SUS spiral			
	Core	Glass			
Diameter	Cable	2.9			
	Core	Binding diameter: 1.5			
Allowable bending radius		R30			
Standard detection object diameter		ϕ1.2			
Smallest allowable detection object diameter		ϕ1.0			

Applicable amplifier

F80R SERIES F70 SERIES F71



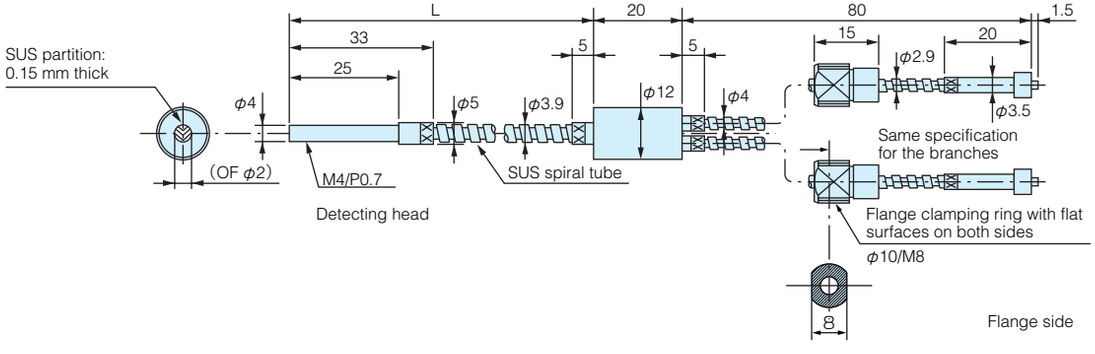
Detecting distances for individual amplifier models (mm)

F80R	Long-distance	480 (380)
	High-speed	270 (210)
F70R/AR		270 (210)
F71R		230 (170)

Values in parentheses show detecting distances for combinations with GTSHN720V.

MODEL	GXHN400 series	Vacuum-side reflective ϕ4 (for flange connection)	Search ID No. 122
Detection method	Reflective		

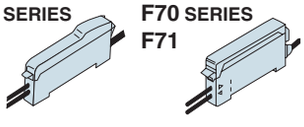
CAD



Model		GXHN405V	GXHN410V
Fiber optic cable length(m)		0.5	1
Ambient temperature		– 30 ~ + 350 ºC	
Material	Covering	SUS spiral	
	Core	Glass	
Diameter	Cable	3.9	
	Core	Binding diameter: 2.0 (2-section)	
Allowable bending radius		R50	
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)	
Smallest allowable detection object diameter		ϕ1.0	

Applicable amplifier

F80R SERIES F70 SERIES F71

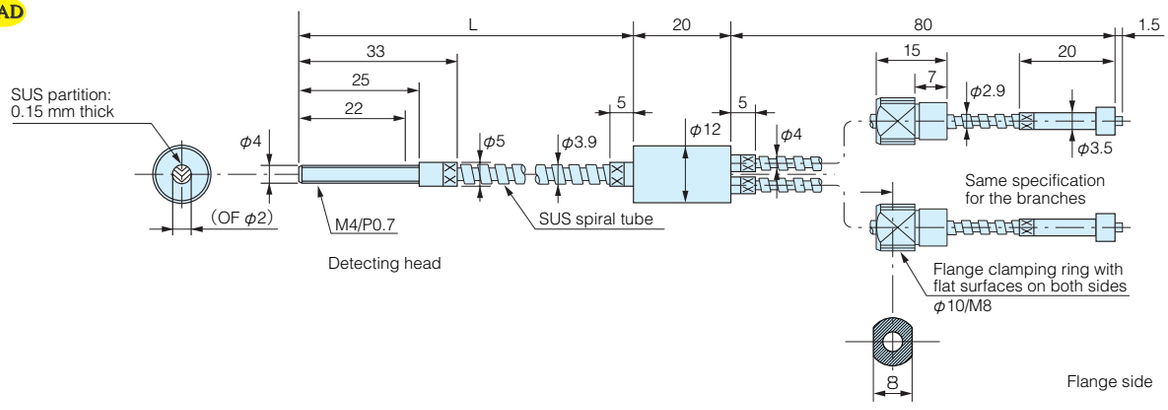


Detecting distances for individual amplifier models (mm)

F80R	Long-distance	60
	High-speed	35
F70R/AR		35
F71R		30

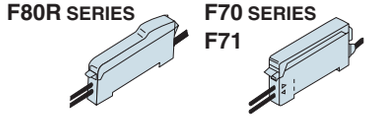
MODEL	GXHN700 series	Vacuum-side reflective with M4 screw (for flange connection)	Search ID No. 123
Detection method	Reflective		

CAD



Model		GXHN705V	GXHN710V
Fiber optic cable length(m)		0.5	1
Ambient temperature		– 30 ~ + 350 ºC	
Material	Covering	SUS spiral	
	Core	Glass	
Diameter	Cable	5	
	Core	Binding diameter: 2.0	
Allowable bending radius		R50	
Standard detection object diameter		50 x 50mm white drawing paper (with F70R)	
Smallest allowable detection object diameter		φ1.0	

Applicable amplifier

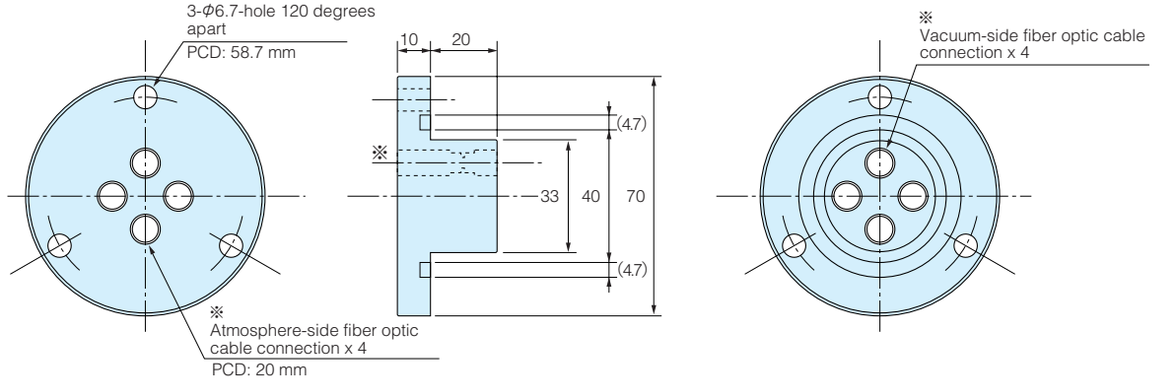


Detecting distances for individual amplifier models (mm)

F80R	Long-distance	60
	High-speed	35
F70R/AR		35
F71R		30

MODEL	FA7VG702	Relay flange 2-ch VG-type φ70	Search ID No. 124
Detection method	————————		

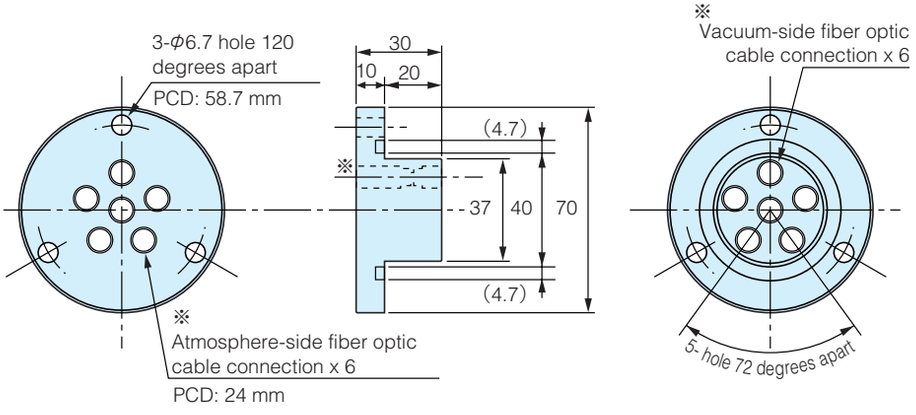
CAD



Model	FA7VG702
Flange	VG-type flange
No. of channels	2ch
No. of relays	4
Leakage	1 x 10 $^{-8}$ Pa·m^3/s (He) max.
Temperature variation	25 ºC/min max.
Ambient temperature	– 30 ~ +250 ºC
Material	SUS 304, glass
Mass	About 700 g

MODEL	FA7VG703	Relay flange 3-ch VG-type ϕ70	Search ID No. 125
Detection method	————————		

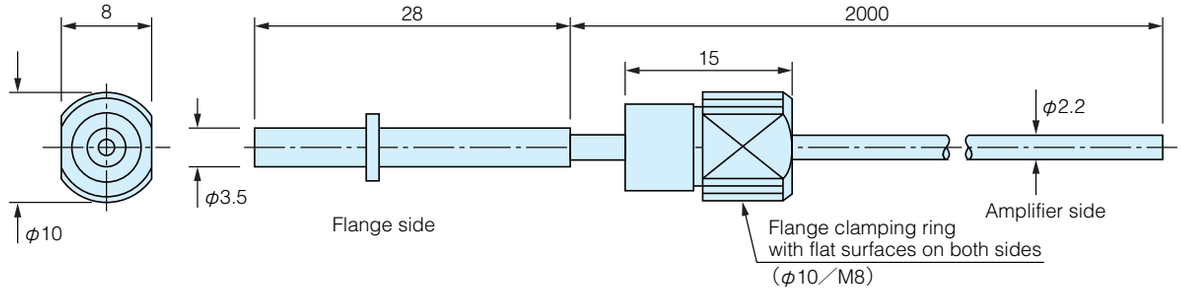
CAD



Model	FA7VG703
Flange	VG-type flange
No. of channels	3ch
No. of relays	6
Leakage	1 x 10 $^{-8}$ Pa·m^3/s (He) max.
Temperature variation	25 ºC/min max.
Ambient temperature	– 30 ~ +230 ºC
Material	SUS 304, glass
Mass	About 700 g

MODEL	FT7VGBC	Atmosphere-side free-cutting (for flange connection)	Search ID No. 126
Detection method	————————		

CAD



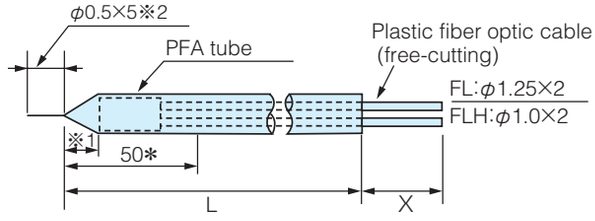
Model		FT7VGBC
Fiber optic cable length(m)		2
Ambient temperature		-35 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.5
Allowable bending radius		R30
Standard detection object diameter		–
Smallest allowable detection object diameter		–

Fiber Optic Cables

MODEL	FL(H) series	Applicable to virtually any type of liquid including water, oil, chemicals, etc., heat resistance 200 ºC	Search ID No. 127
Detection method	Dioptric		

Dimensions (in mm)

CAD



*Unbendable

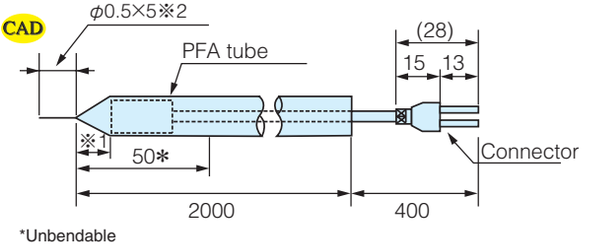
*2: Can be cut if unnecessary

Model	PFA diameter	Fiber optic cable diameter	Tapered section (*1)
FL series	6.35	1.25	7
FL(H) series	6.35	1.0	7
FL-7161	4.0	1.0	5

Model	PFA length: L	Fiber optic cable length: X
FL(H)-7013	200	800
FL(H)-7013-02	200	2300
FL-7161		
FL(H)-7013-05	500	2000
FL-7161-05		
FL(H)-7013-1	1000	1500
FL-7161-1		
FL(H)-6BC	2000	500
FL-7161-2		

Heat-resistant

CAD



*Unbendable

*2: Can be cut if unnecessary

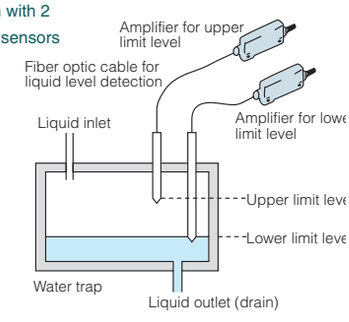
Model	PFA diameter	Tapered section (*1)
FL-7326	4.0	5
FL-7314	6.35	7

Chemical resistance of PFA (fluoroplastic)

○: applicable
×: inapplicable

Substance	PFA	Substance	PFA
Bunker A, B, C heavy oil	○	Mineral oil	○
Aniline	○	Ethylene trichloride	○
Acrylic nitrile	○	Bichromate of soda	○
Asphalt	○	Barium nitrate	○
Acetone	○	Silicon oil	○
Alcohol	○	Vegetable oil	○
Ammonia	○	Thinner	○
Isooctane	○	Barium hydroxide	○
Isobutyl alcohol	○	Phenol	○
Isobutyl methyl ketone	○	Turbine oil	○
Ethanol (ethyl alcohol)	○	Sodium carbonate	○
Ether	○	Turpentine	○
Ethylene glycol	○	Natural volatile oil	○
Enamel paint	○	Kerosene	○
Ammonium chloride	○	Trichloroethane	○
Calcium chloride	○	Trichloroethylene	○
Sodium chloride	○	Toluene	○
Barium chloride	○	Naphtha	○
Chlorine	○	Lactic acid	○
Gasoline	○	Nitrobenzene	○
Glass raw material	○	Fluorine	×
Dilute hydrochloric acid	○	Ferrosilicon	○
Dilute sodium hydroxide	○	Freon 11	○
Dilute acetic acid	○	Propyl alcohol	○
Dilute nitric acid	○	Propylene glycol	○
Dilute sulfuric acid	○	Benzene	○
Citric acid	○	Methanol (methyl alcohol)	○
Glycerin	○	Methyl violet	○
Cresol	○	Water	○
Chloroform	○	Carbon tetrachloride	○
Light oil	○	Ammonium sulfate	○

● Example of liquid level detection with 2 liquid level detection fiber optic sensors



Specification

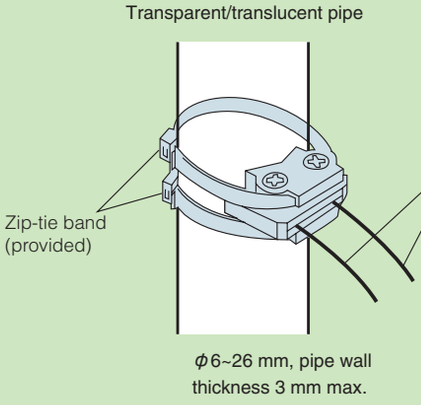
Model		FL-7161	FL-7161-05	FL-7161-1	FL-7161-2	
	FL-7013	FL-7013-02	FL-7013-05	FL-7013-1	FL-6BC	FL-7326
	FLH-7013	FLH-7013-02	FLH-7013-05	FLH-7013-1	FLH-6BC	FL-7314
Detection method	Dioptric					
Detection object	Liquid *1					
Repeatability	1 mm max. (for water)					
Withstand pressure	– 0.1 MPa ~ +0.5 MPa					
Ambient temperature *2	– 40 ~ +80 ºC (FL type) / – 40 ~ +100 ºC (FLH type)					– 40 ~ +200 ºC
Allowable bending radius	R40 mm (50 mm from tip unbendable)					R50mm
Fiber optic cable length	See "Dimensions" above					
Material: Covering	PFA					
Material: Fiber optic cable	Plastic					Glass
Mass	50g max.		80g max.			150g max.
Applicable amplifier	F80R、F70AR、F70R					

*1 : Chromatic or achromatic transparent material (be sure to test with a sample in advance for liquid with high viscosity or turbidity).

*2 : Non-condensing in PFA tube.

MODEL	FU901BC	Simple installation requiring no preparation and reliable detection	Search ID No. 128
Detection method	Dioptric		

Mounting



- When two sets of sensors are used for upper and lower limit detection, etc., the minimum pitch is 15 mm.

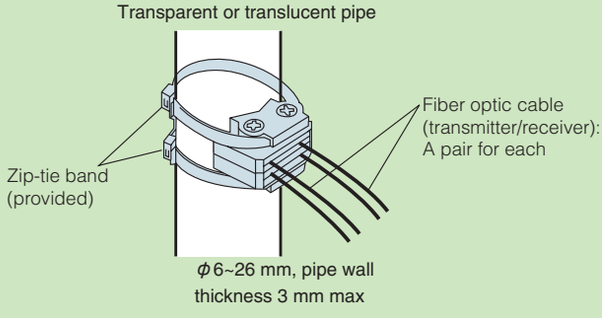
Specification

Detection object	Liquid *1
Applicable pipe	Transparent pipe of φ6-26 mm
Repeatability	1 mm max.
Ambient temperature	– 40 ~ +105 ºC
Ambient humidity	35-85%RH
Allowable bending radius	R10 mm (fiber optic cable)
Fiber optic cable length	2 m (free-cutting)
Material	Body: polycarbonate Fiber optic cable: plastic (cross-linked polyethylene-covered)
Protective structure	IP 50
Mass	About 7 g
Applicable amplifier	F80R, F70R, F70AR, F71R, F2R

*1:Some types of liquid such as of milky white color may be undetectable.

Samp

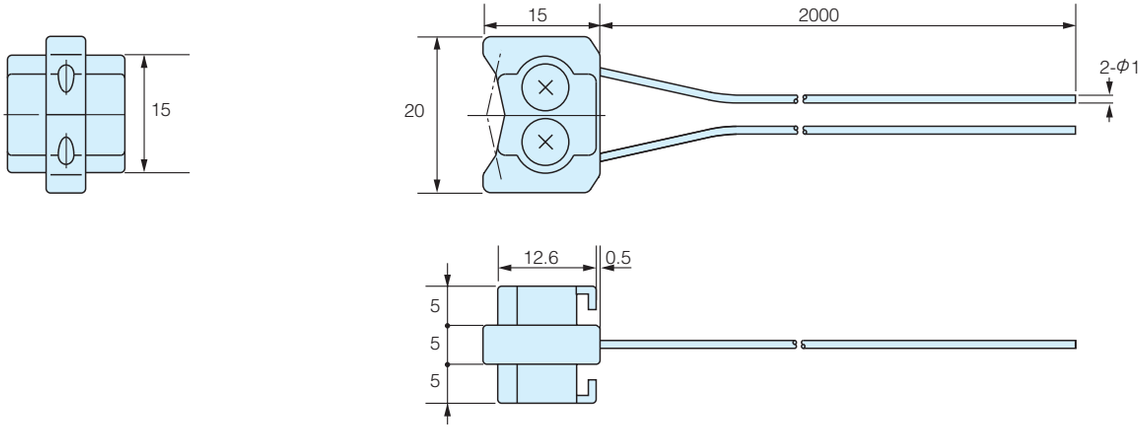
Level control with adjacently mounted 2 sets



- Adjacent mounting allows the minimum pitch of 5 mm (M3 countersunk screws for assembly are separately required).

Dimensions (in mm)

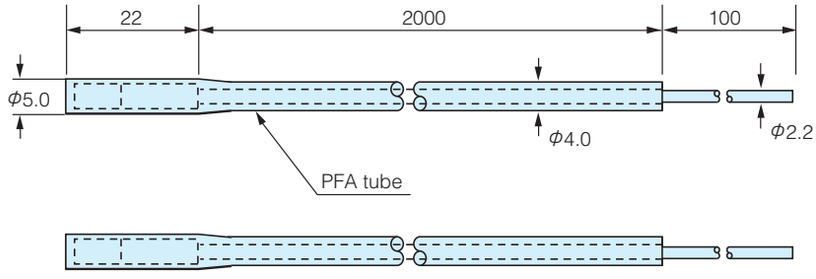
CAD



Fiber Optic Cables

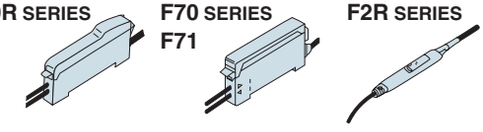
MODEL	FTH7FEBC	Long-distance lens-integrated, heat resistance 115 ºC	Search ID No. 129
Detection method	Through-beam		

CAD

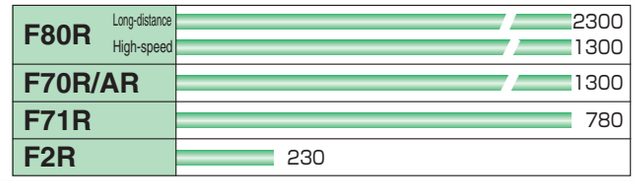


Model		FTH7FEBC
Fiber optic cable length(m)		2.1
Ambient temperature		– 30 ~ + 105 ºC
Material	Covering	Heat-resistant polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0
Allowable bending radius		R40 min.
Standard detection object diameter		φ4
Smallest allowable detection object diameter		φ0.03 (excluding F71R, F2R)

Applicable amplifier

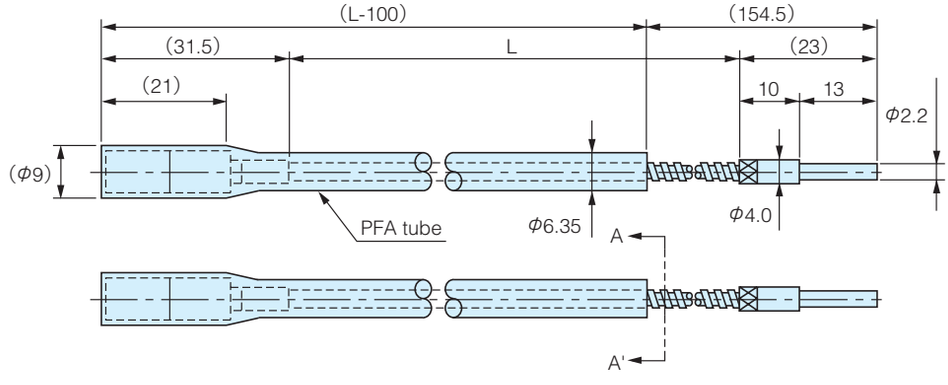


Detecting distances for individual amplifier models (mm)



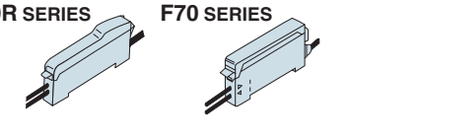
MODEL	GTH500FEJ	PFA tube covering, heat resistance 200 ºC	Search ID No. 130
Detection method	Through-beam		

CAD

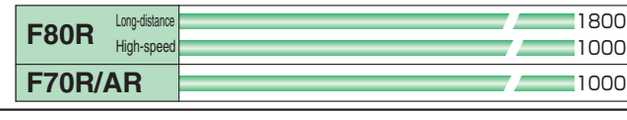


Model		GTH510FEJ	GTH540FEJ
Fiber optic cable length(m)		1	4
Ambient temperature		– 40 ~ + 200 ºC	
Material	Covering	SUS spiral	
	Core	Glass	
Diameter	Cable	2.8	
	Core	Binding diameter: 1.1	
Allowable bending radius		R50	
Standard detection object diameter		φ6	
Smallest allowable detection object diameter		–	

Applicable amplifier

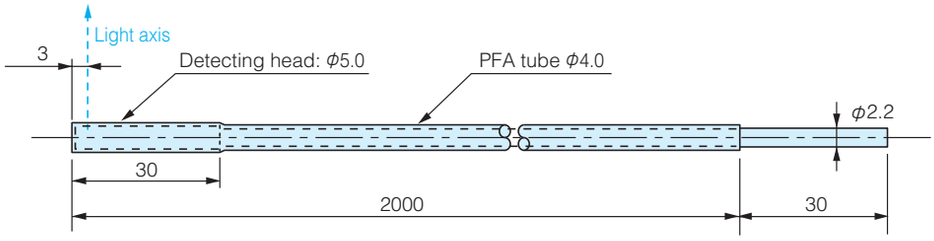


Detecting distances for individual amplifier models (mm)



MODEL	FTV7FEBC	Through-beam side-view	Search ID No. 131
Detection method	Through-beam		

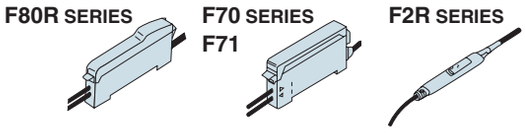
CAD



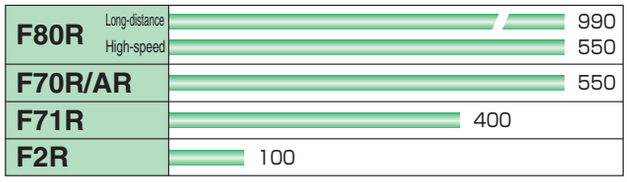
Note: The 50-mm section from the tip of the detecting head is unbendable. Used as a pair

Model		FTV7FEBC
Fiber optic cable length(m)		2
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Heat-resistant polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0
Allowable bending radius		R40 min.
Standard detection object diameter		ϕ1.0
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier

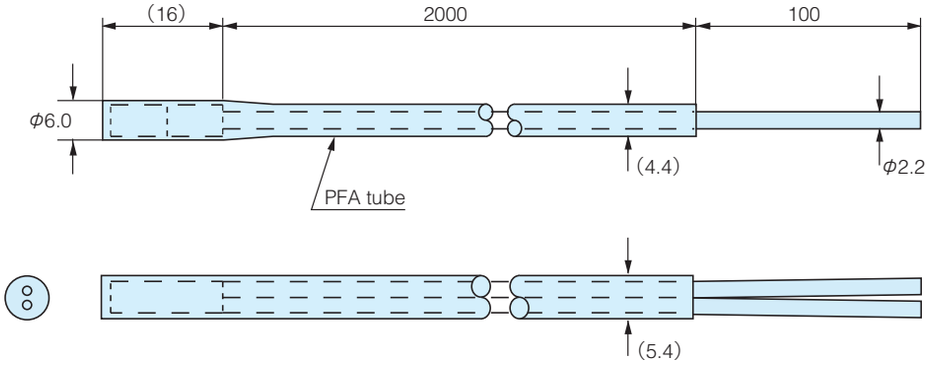


Detecting distances for individual amplifier models (mm)



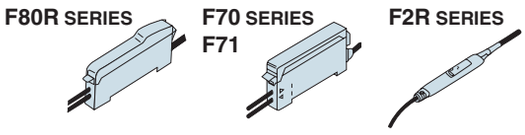
MODEL	FRH7FEBC	Excellent environment resistance	Search ID No. 132
Detection method	Reflective		

CAD

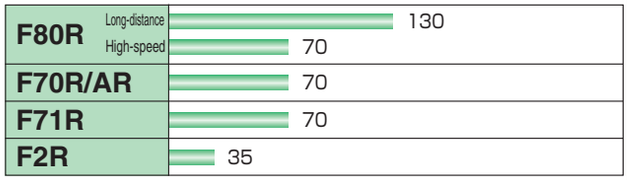


Model		FRH7FEBC
Fiber optic cable length(m)		2.1
Ambient temperature		– 30 ~ + 105 ºC
Material	Covering	Heat-resistant polyethylene
	Core	Plastic
Diameter	Cable	2.2
	Core	1.0
Allowable bending radius		R40
Standard detection object diameter		100 x 100mm white drawing paper (with F70R)
Smallest allowable detection object diameter		ϕ0.015 (excluding F71R, F2R)

Applicable amplifier



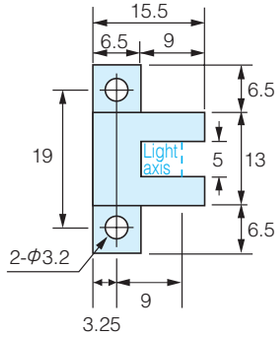
Detecting distances for individual amplifier models (mm)

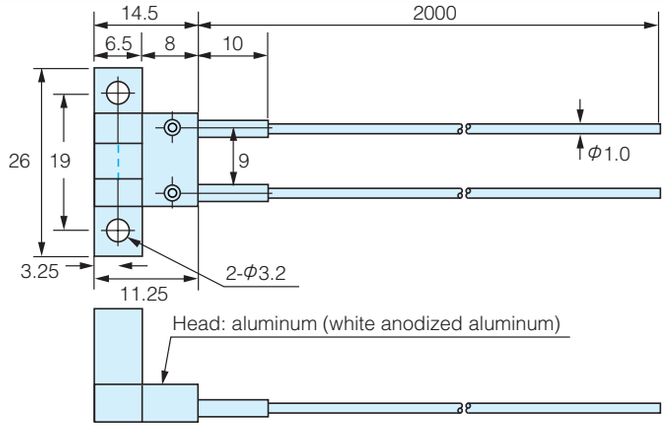


Note) The sensor may stay activated with the maximum sensitivity setting. If this occurs, reduce the sensitivity.

MODEL	FU1001BC	Heat resistance 115 ºC, replaceable with photo micro sensor	Search ID No. 133
Detection method	Through-beam		

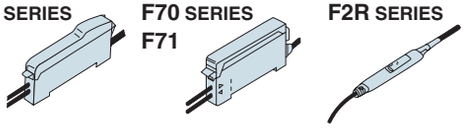
CAD





Model		FU1001BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ 115 ºC (105 ºC max. for continuous use)
Material	Covering	Heat-resistant polyethylene
	Core	Plastic
Diameter	Cable	1.0
	Core	0.5
Allowable bending radius		R15
Standard detection object diameter		φ2
Smallest allowable detection object diameter		φ0.03 (excluding F71R, F2R)

Applicable amplifier

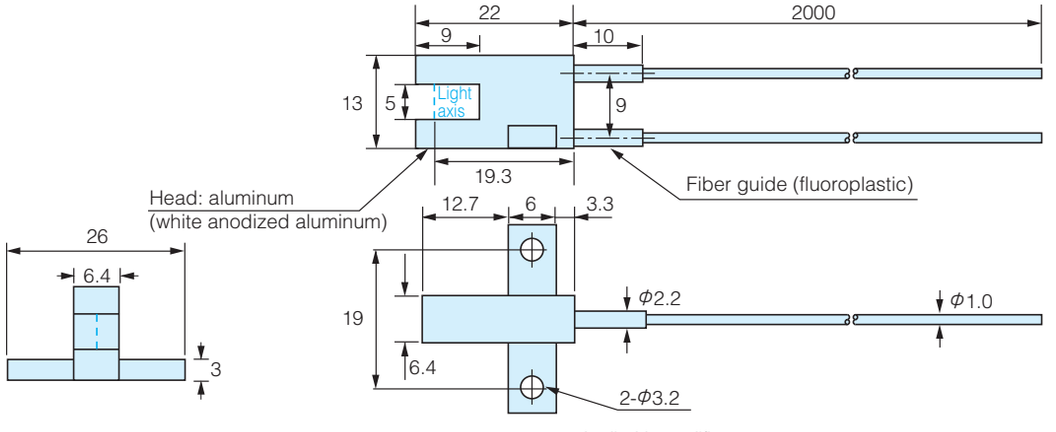


Detecting distances for individual amplifier models (mm)

F80R	Long-distance / High-speed	5
F70R/AR		5
F71R		5
F2R		5

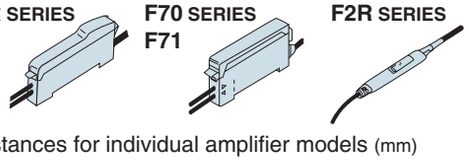
MODEL	FU1002BC	Heat resistance 115 ºC, replaceable with photo micro sensor	Search ID No. 134
Detection method	Through-beam		

CAD



Model		FU1002BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ +115 ºC (105 ºC max. for continuous use)
Material	Covering	Heat-resistant polyethylene
	Core	Plastic
Diameter	Cable	1.0
	Core	0.5
Allowable bending radius		R15
Standard detection object diameter		φ2
Smallest allowable detection object diameter		φ0.03 (excluding F71R, F2R)

Applicable amplifier

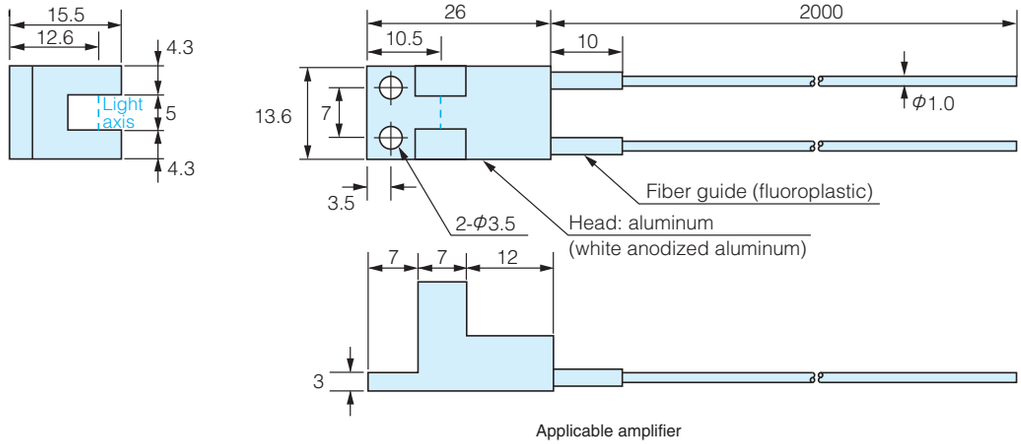


Detecting distances for individual amplifier models (mm)

F80R	Long-distance / High-speed	5
F70R/AR		5
F71R		5
F2R		5

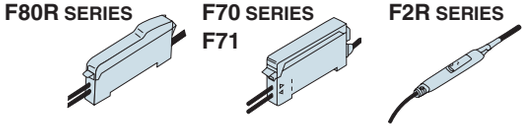
MODEL	FU1004BC	Heat resistance 115 ºC, replaceable with photo micro sensor	Search ID No. 135
Detection method	Through-beam		

CAD

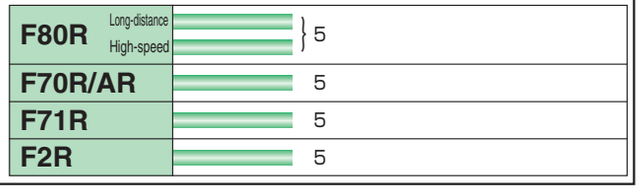


Model		FU1004BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ +115 ºC (105 ºC max. for continuous use)
Material	Covering	Heat-resistant polyethylene
	Core	Plastic
Diameter	Cable	1.0
	Core	0.5
Allowable bending radius		R15
Standard detection object diameter		ϕ2
Smallest allowable detection object diameter		ϕ0.03 (excluding F71R, F2R)

Applicable amplifier

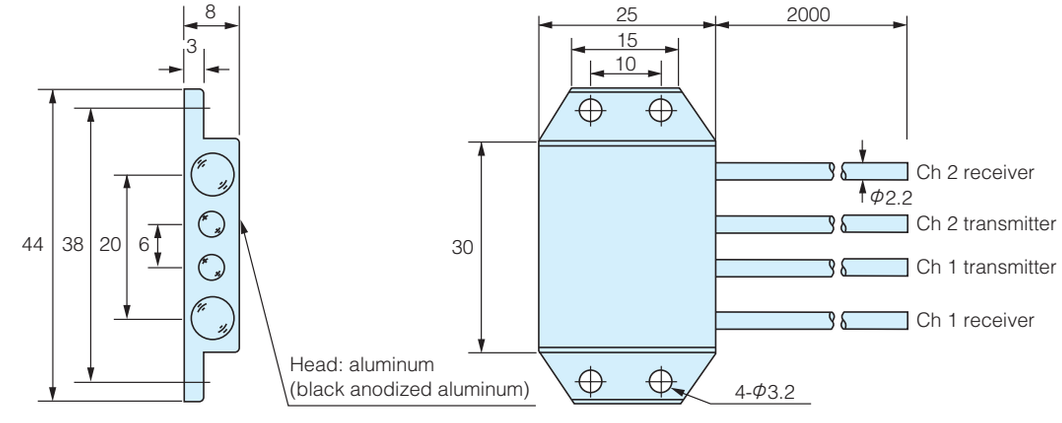


Detecting distances for individual amplifier models (mm)



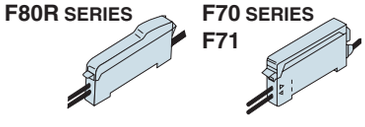
MODEL	FR706BC	Fiber optic cables for 2 channels integrated for stable detection	Search ID No. 136
Detection method	Reflective		

CAD

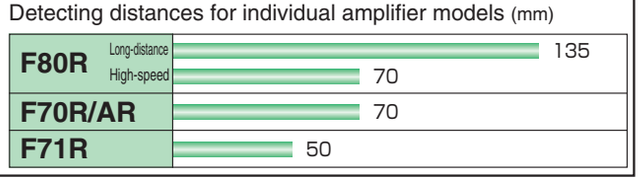


Model		FR706BC
Fiber optic cable length(m)		2 (free-cutting)
Ambient temperature		– 30 ~ + 70 ºC
Material	Covering	Polyethylene
	Core	Plastic
Diameter	Cable	2.2 x 4
	Core	Transmitter: ϕ1 / Receiver: ϕ1.5 (for channels 1 and 2)
Allowable bending radius		R30
Standard detection object diameter		300 mm silicon wafers, etc. (with F70R)
Smallest allowable detection object diameter		ϕ0.03 (excluding F71R, F2R)

Applicable amplifier



Detecting distances for individual amplifier models (mm)



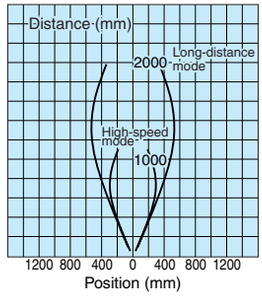
Characteristics Tables

Attachments

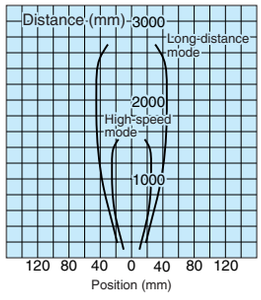
Fiber Optic Cables

Directional Characteristics (Typical Example) with F80R

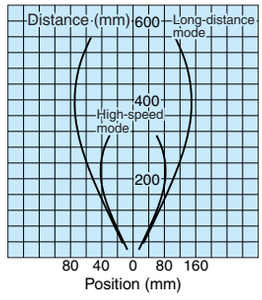
FT105BC



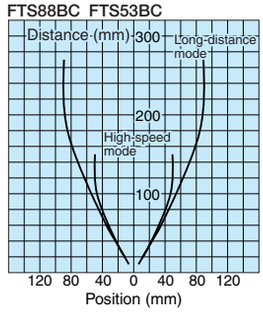
FT7202BC



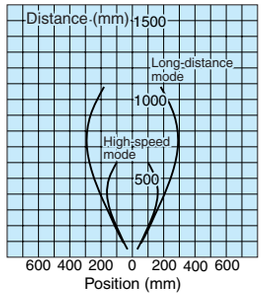
FT8EBC



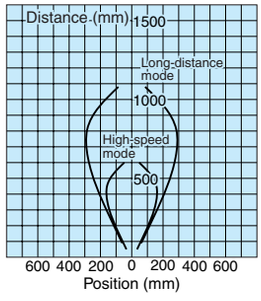
FT8BC FT81BC
FTS8BC FTS5BC
FTS88BC FTS53BC



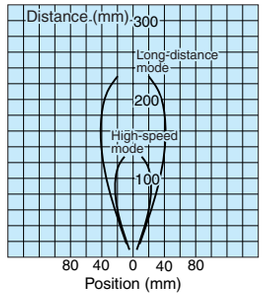
FT108BC



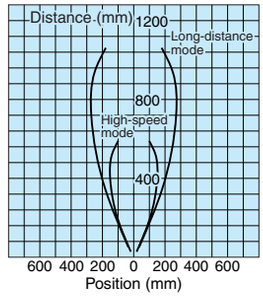
FT5BC FT7BC
FT3BC FTH7BC



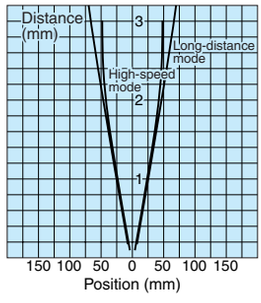
FT19YBC



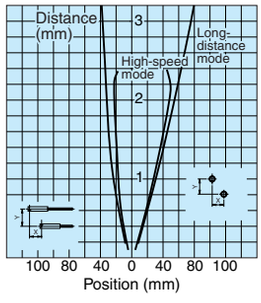
FT5YBC



FTN5BC



FTVN5BC
FTVN501BC



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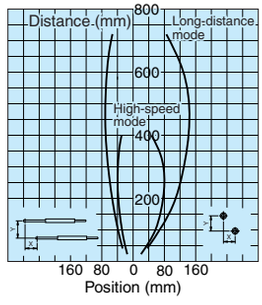
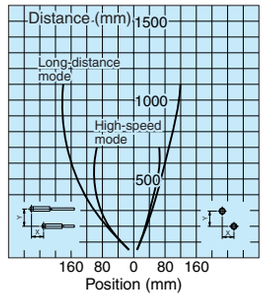
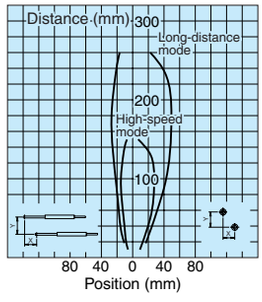


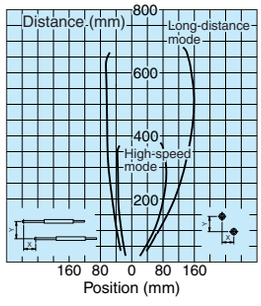
FTV7BC
FTV74BC



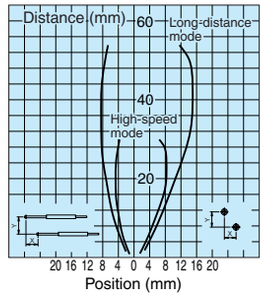
FTSV82BC



FTSV73BC



FTSV93BC



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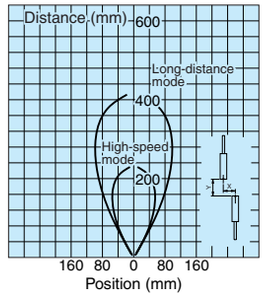

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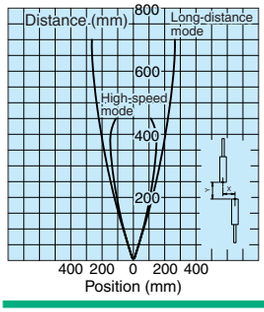
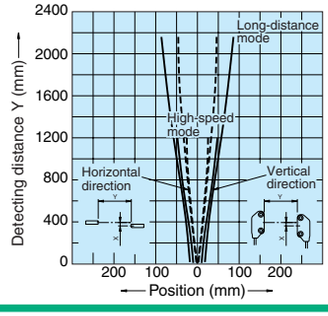
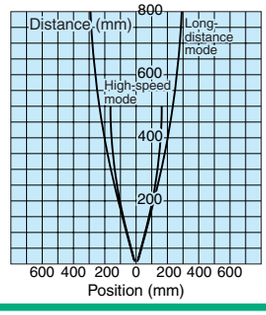


FTVW7YBC



FT704BC



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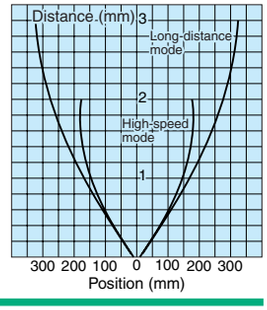
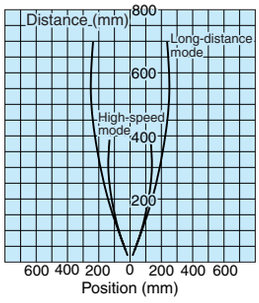


Directional Characteristics (Typical Example) with F80R

GLT500J series GTH500J series GT500J series



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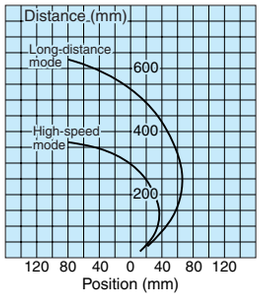

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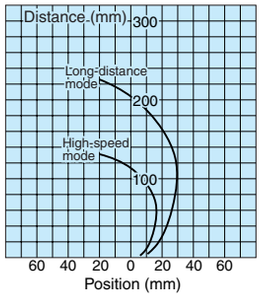

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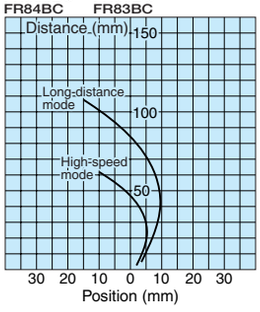
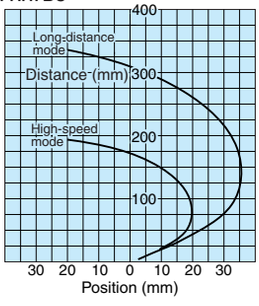


FR5BC FR7BC FRH7BC



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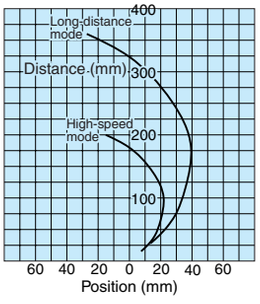

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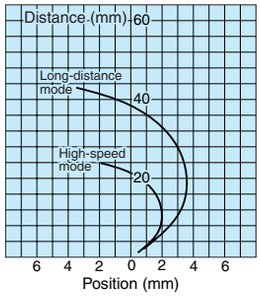

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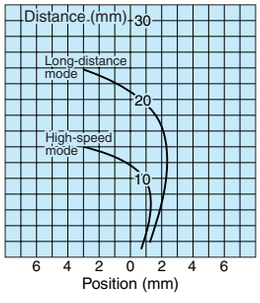
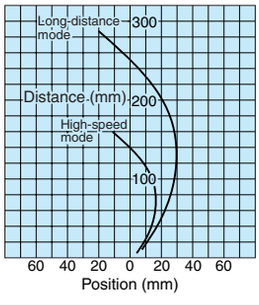


FR5YBC FR7YBC



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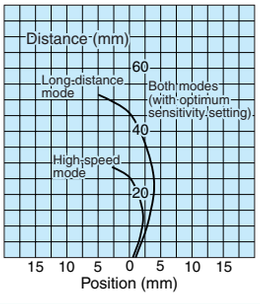

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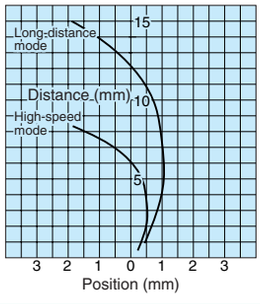
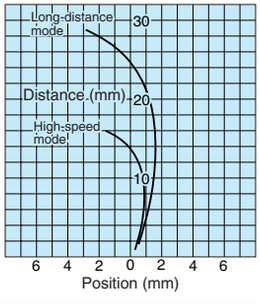
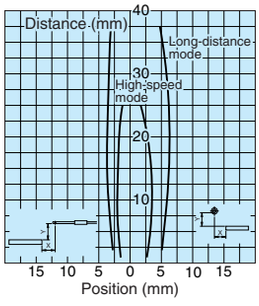


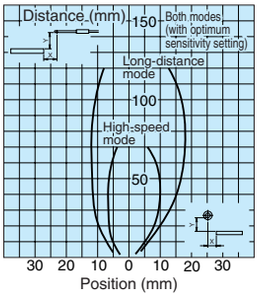
FRS200J series FRS2003J series



FRSV8BC FRSV83BC



FRSV5BC FRSV55BC



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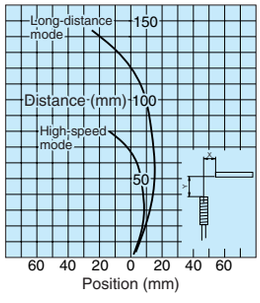
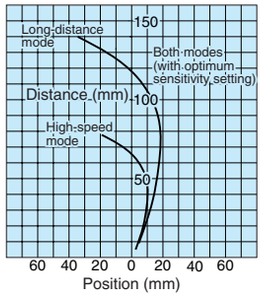
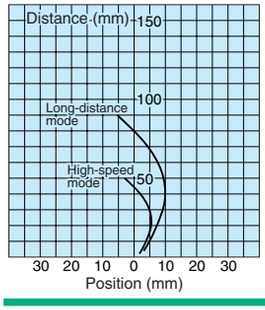


FX200J series



FX83BC FX84BC FX8401BC



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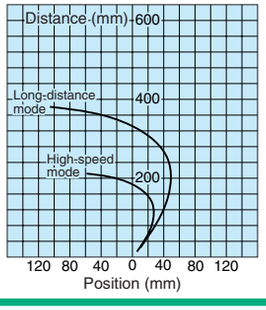

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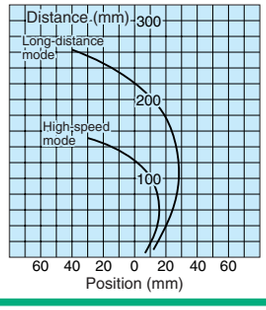

Fiber Optic Cables

Directional Characteristics (Typical Example) with F80R

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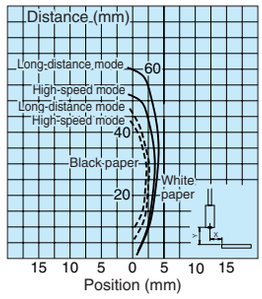

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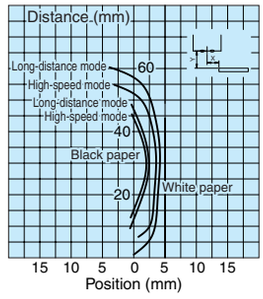

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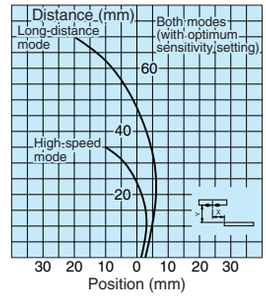

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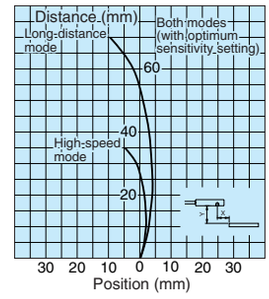

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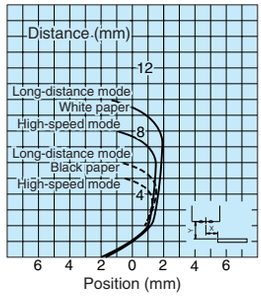

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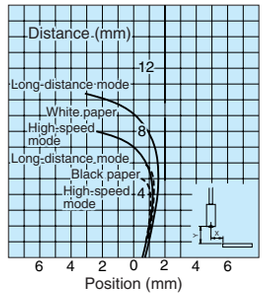

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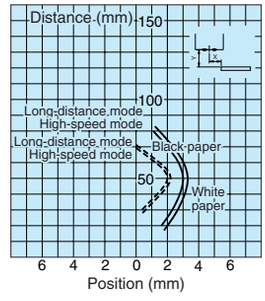

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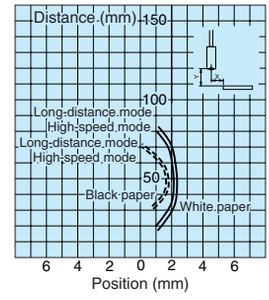

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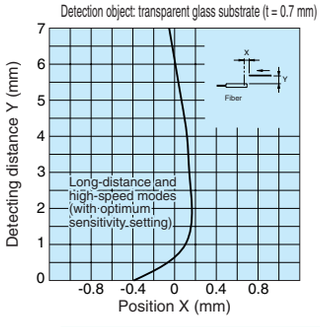

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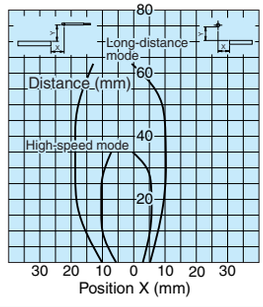

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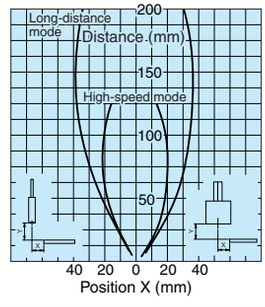
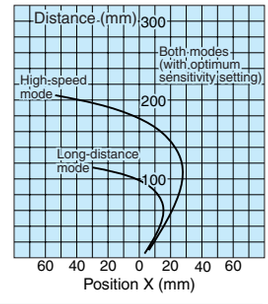


GLX500J series
GXH500J series
GX500J series



Distance-Output Characteristics (Typical Example) with F80R

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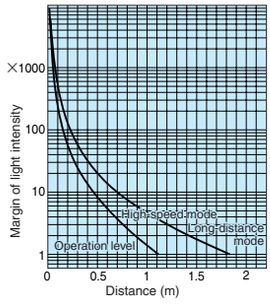

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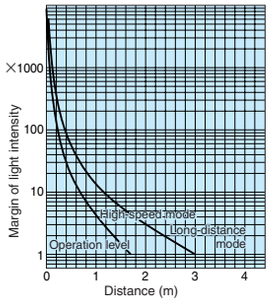
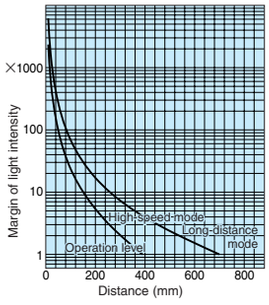


FT8EBC



FT8BC FT81BC
FTS8BC FTS5BC
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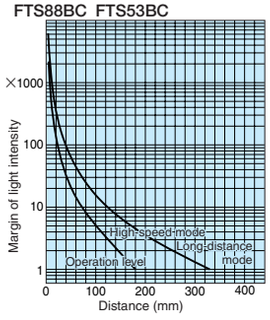

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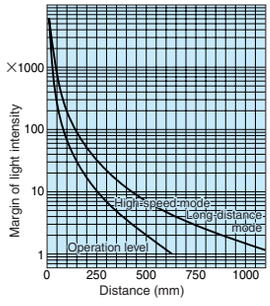

FT5BC FT7BC
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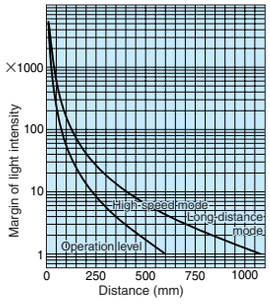

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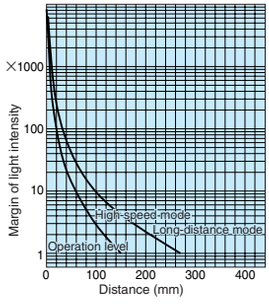

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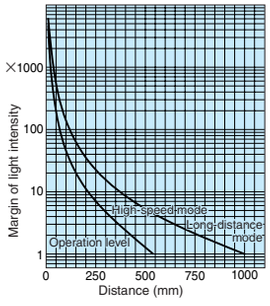

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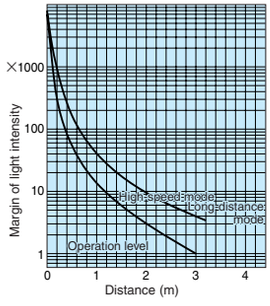
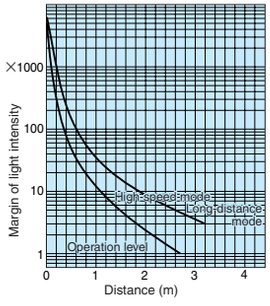


FTVN5BC
FTVN501BC



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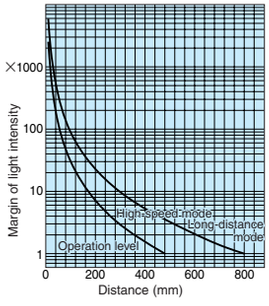
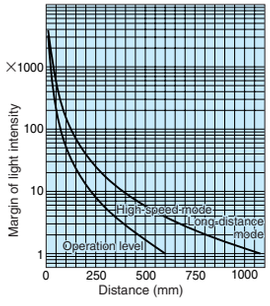


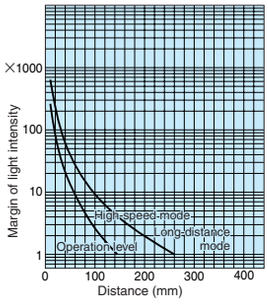
FTV7BC
FTV74BC



Fiber Optic Cables

Distance-Output Characteristics (Typical Example) with F80R

FTSV82BC



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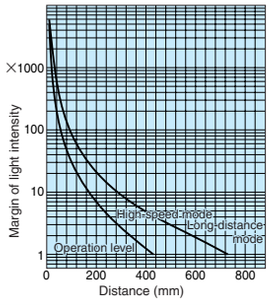

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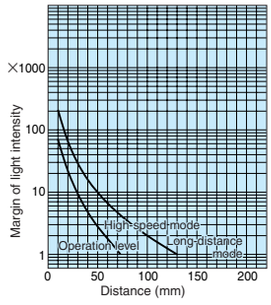

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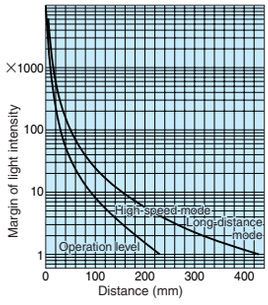

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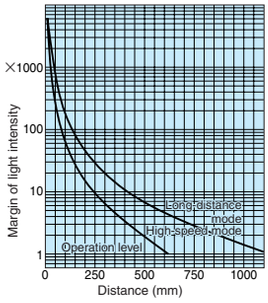

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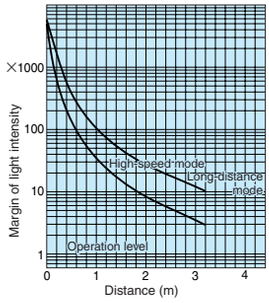

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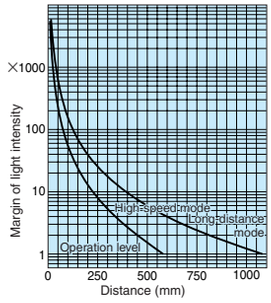
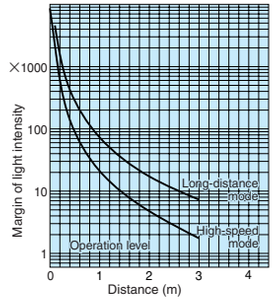
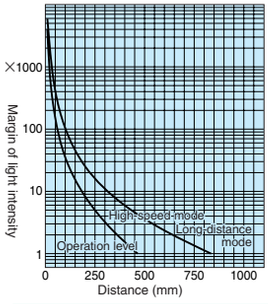


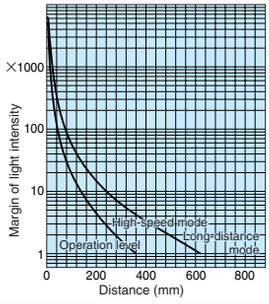
FTH7FEBC



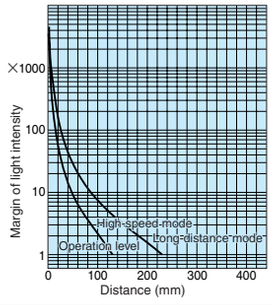
GLT500J series
GT500J series
GTH500J series



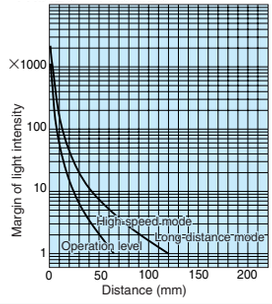
FR105BC



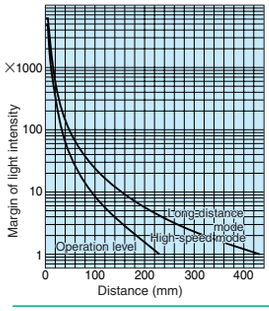
FR8EBC



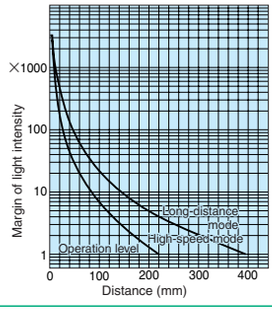
FR8BC FRS53BC
FRS5BC FRS84BC
FR83BC FRS8BC
FR84BC FRS83BC



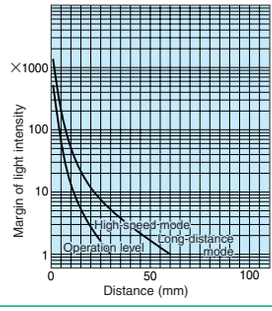
FR5BC
FR7BC
FRH7BC



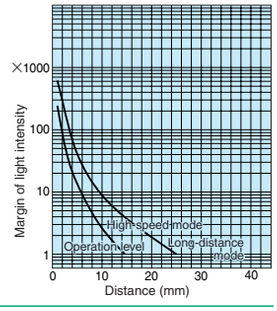
FR108BC
FR1083BC



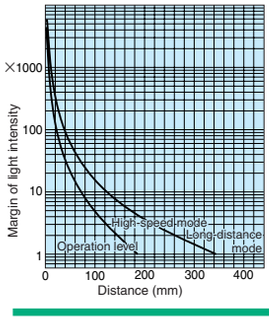
FR19YBC



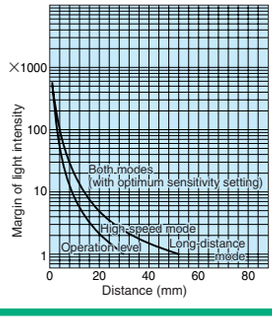
FR8YBC



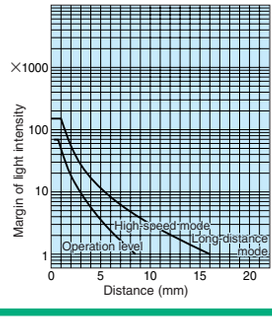
FR5YBC
FR7YBC



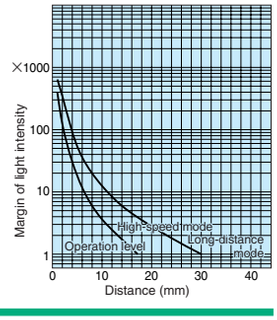
FXN84BC



FXN841BC

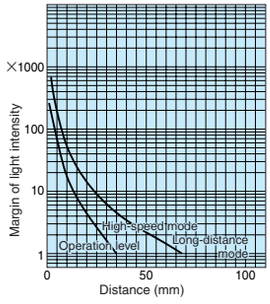


FRS200J series
FRS2003J series

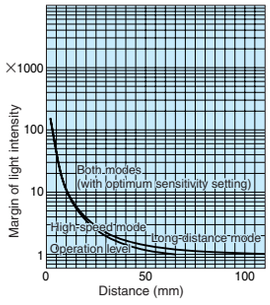


Distance-Output Characteristics (Typical Example) with F80R

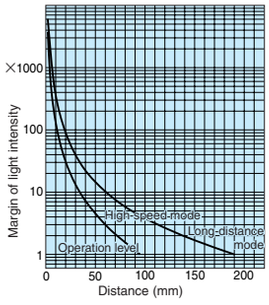
FRSV8BC
FRSV83BC



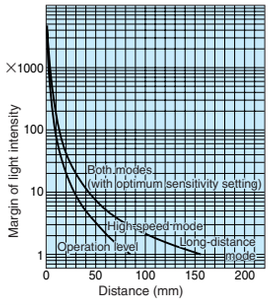
FRSV5BC
FRSV55BC



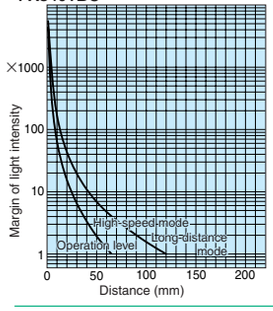
FX801BC
FX8404BC



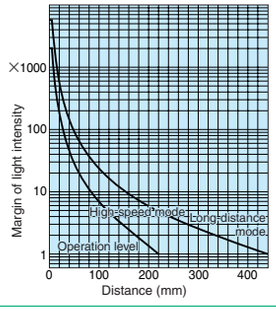
FX200J series



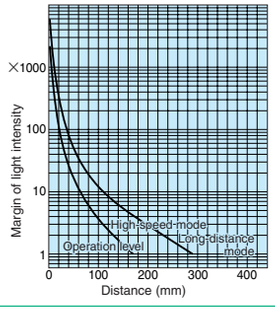
FX83BC
FX84BC
FX8401BC



FX716BC

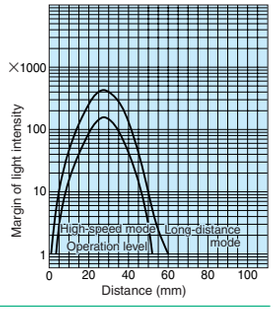


FX7BC



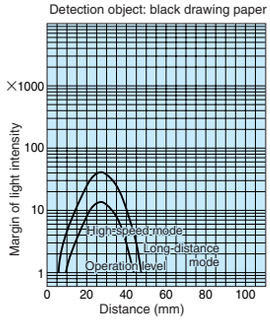
FZ801BC

Detection object: white drawing paper



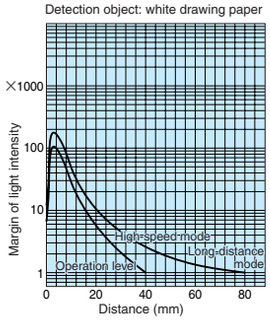
FZ801BC

Detection object: black drawing paper



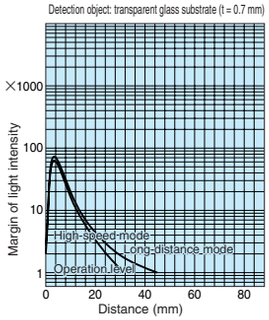
FZV8301BC

Detection object: white drawing paper



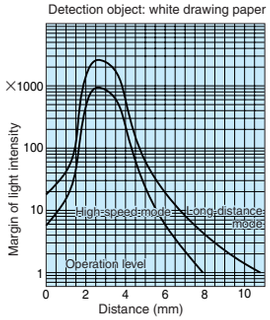
FZV8301BC

Detection object: transparent glass substrate (t = 0.7 mm)



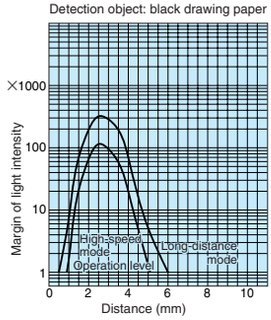
FZ802BC

Detection object: white drawing paper



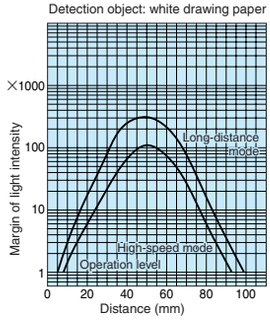
FZ802BC

Detection object: black drawing paper



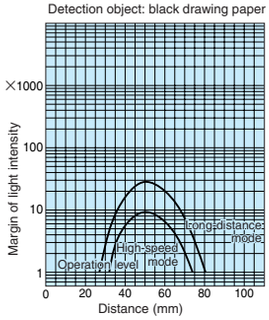
FZ1901YBC

Detection object: white drawing paper



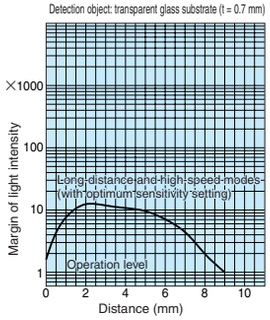
FZ1901YBC

Detection object: black drawing paper

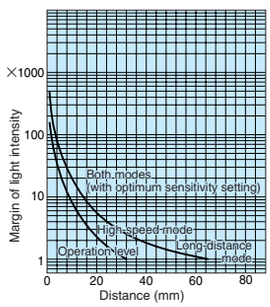


FZV191YBC

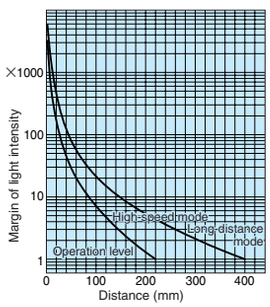
Detection object: transparent glass substrate (t = 0.7 mm)



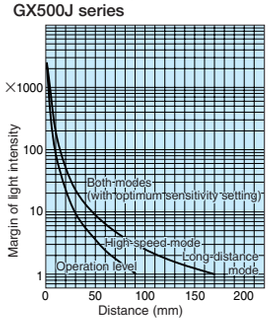
FRLV816BC



FRL7W16BC FRL702BC
FRL732BC FRLV732BC



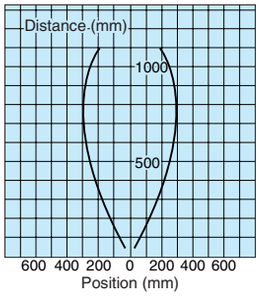
GLX500J series
GXH500J series
GX500J series



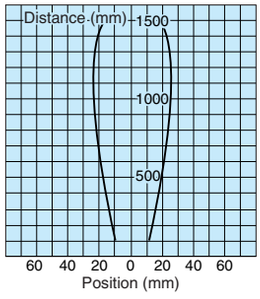
Fiber Optic Cables

Directional Characteristics (Typical Example) with F70R/F70AR

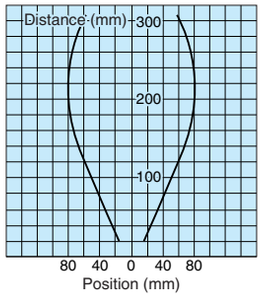
FT105BC



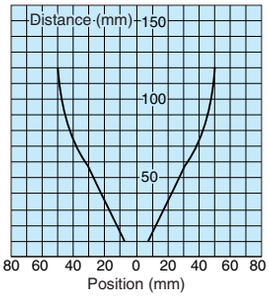
FT7202BC



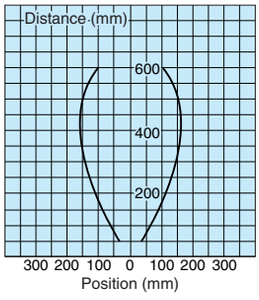
FT8EBC



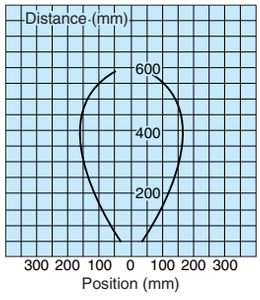
FT8BC FT81BC
FTS8BC FTS5BC
FTS88BC FTS53BC



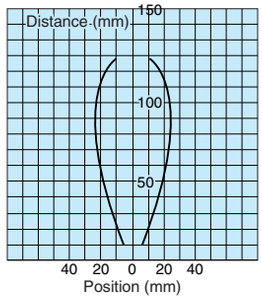
FT108BC



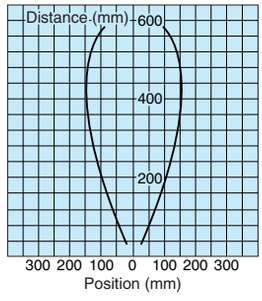
FT5BC FT7BC
FT3BC FTH7BC



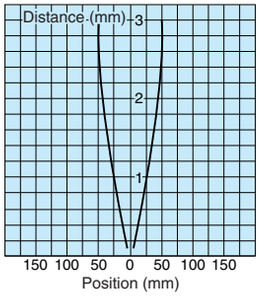
FT19YBC



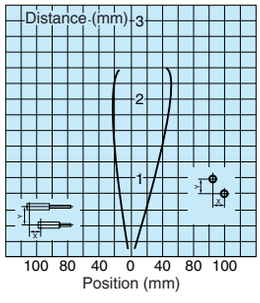
FT5YBC



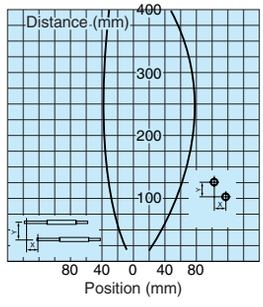
FTN5BC



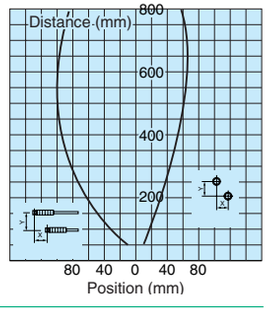
FTVN5BC
FTVN501BC



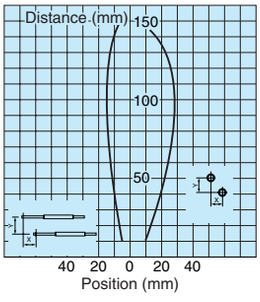
FTSV5BC



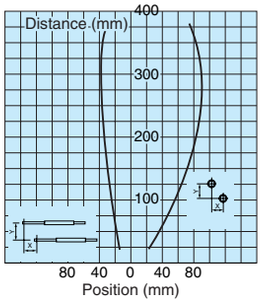
FTV7BC
FTV74BC



FTSV82BC



FTSV73BC



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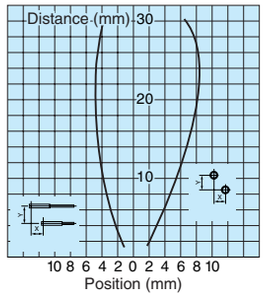
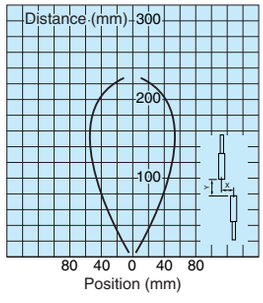
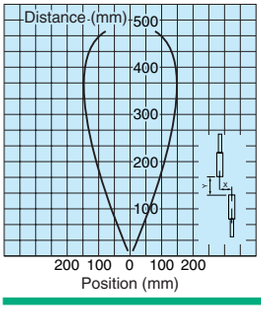


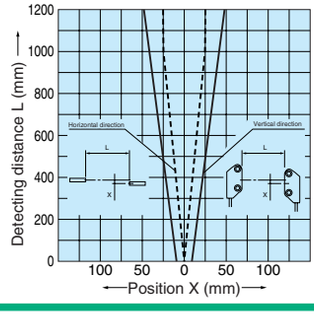
FTL706BC



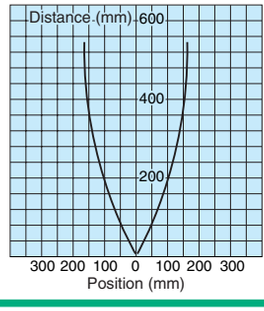
FTL716BC
FTL7165BC



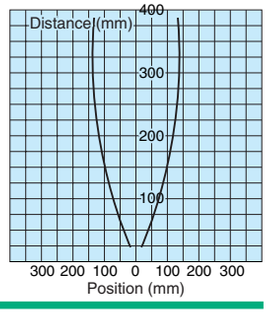
FTVW7YBC



FT704BC

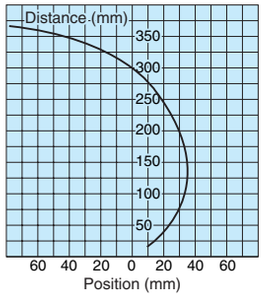


GLT500J series GTH500J series
GT500J series

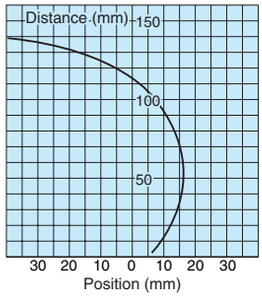


Directional Characteristics (Typical Example) with F70R/F70AR

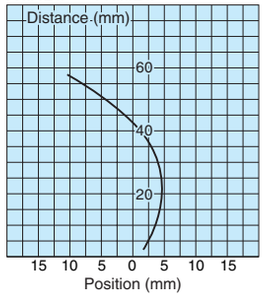
FR105BC



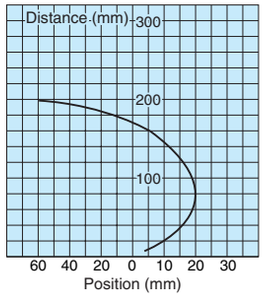
FR8EBC



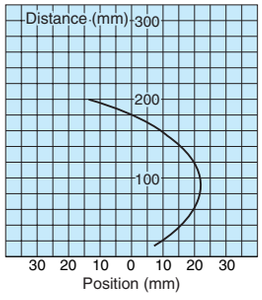
FR8BC FRS53BC FRS5BC FRS84BC FRS83BC FRS8BC FR84BC FR83BC



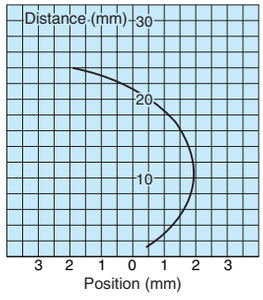
FR5BC FR7BC FRH7BC



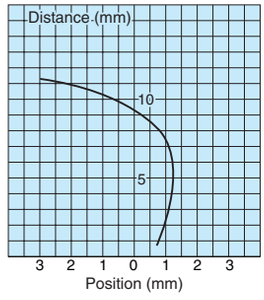
FR108BC FR1083BC



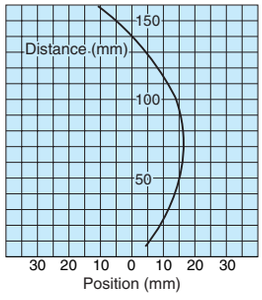
FR19YBC



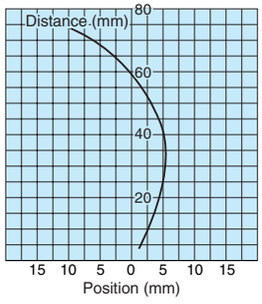
FR8YBC



FR7YBC FR5YBC



FXN84BC



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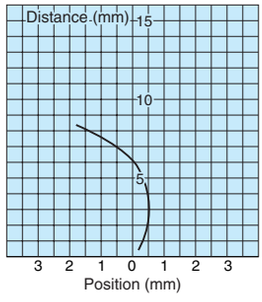
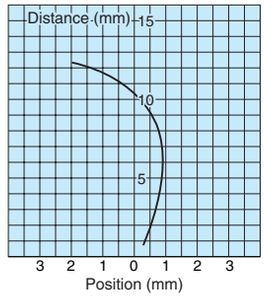
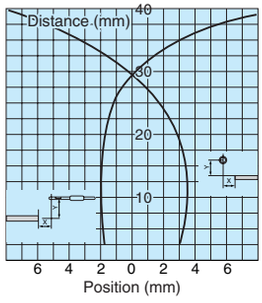


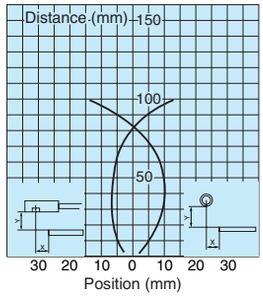
FRS200J series FRS2003J series



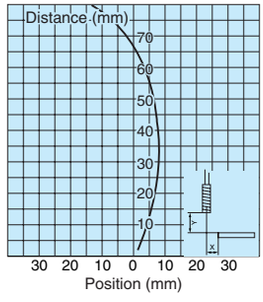
FRSV83BC FRSV8BC



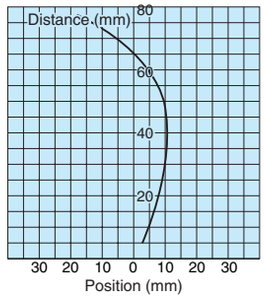
FRSV5BC FRSV55BC



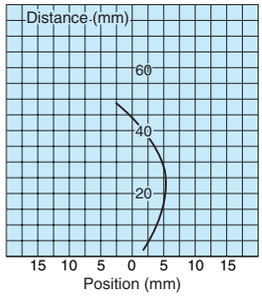
FX801BC FX8404BC



FX200J series



FX83BC FX8401BC FX84BC



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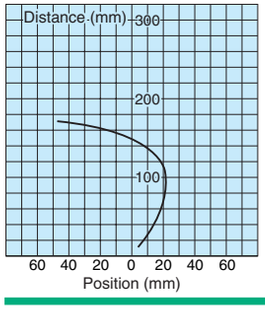
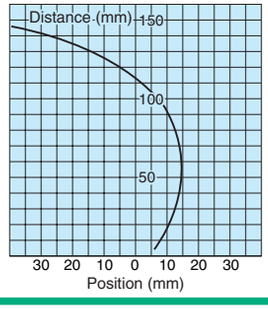


FX7BC



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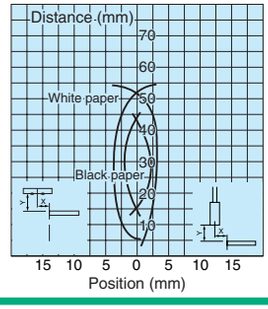

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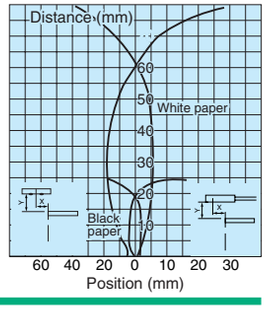
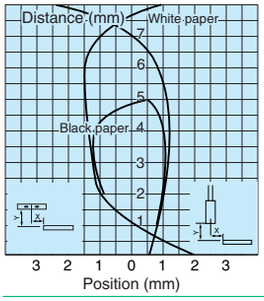


Fiber Optic Cables

Directional Characteristics (Typical Example) with F70R/F70AR

FZ802BC



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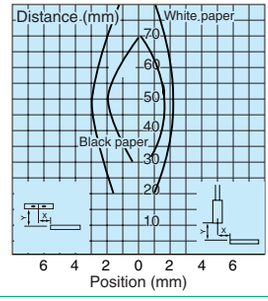

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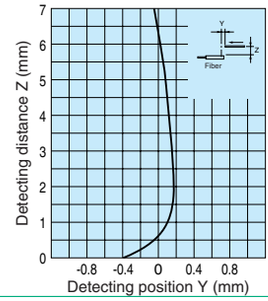
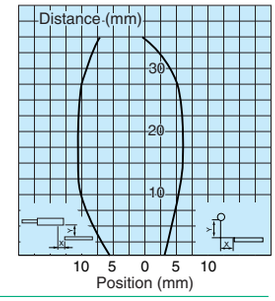


FRLV816BC



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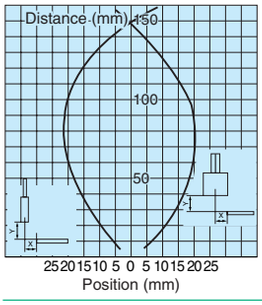
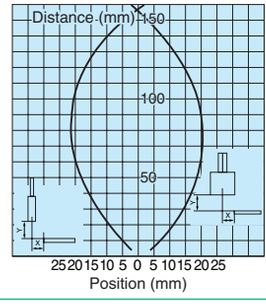
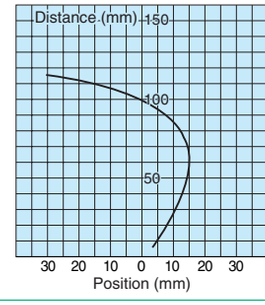


FRL732BC
FRLV732BC



GLX500J series
GXH500J series
GX500J series



Distance-Output Characteristics (Typical Example) with F70R/F70AR

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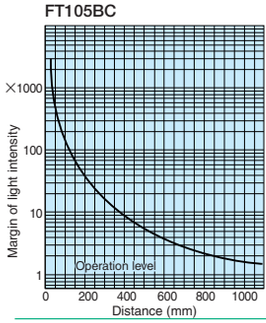

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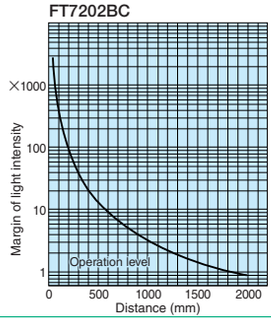
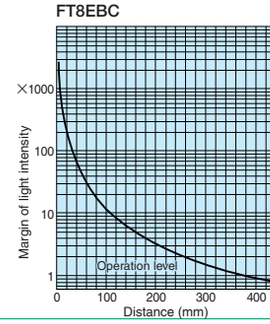
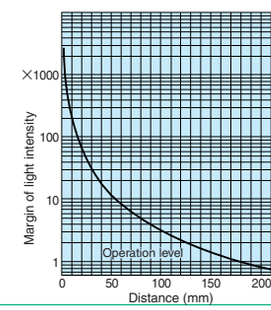


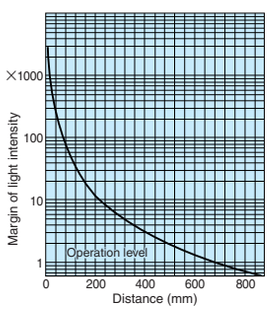
FT8EBC



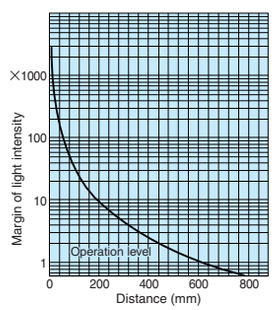
FT8BC FTS5BC
FTS8BC FTS53BC
FTS88BC FT81BC



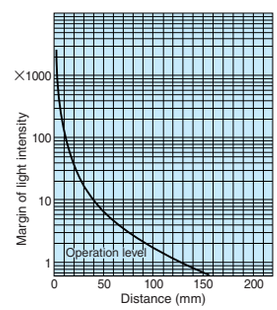
FT108BC



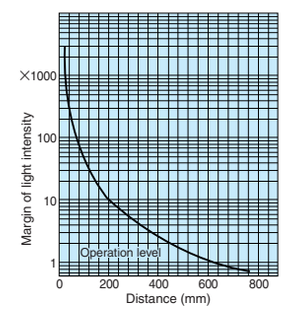
FT5BC FT7BC
FT3BC FTH7BC



FT19YBC



FT5YBC



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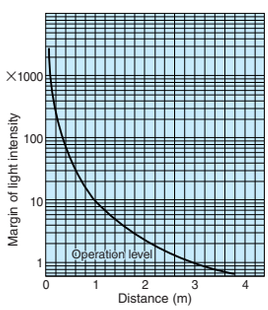

FTVN5BC
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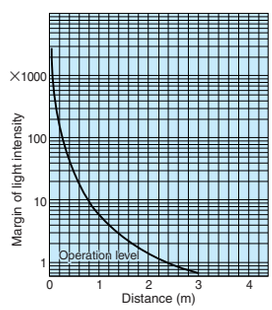
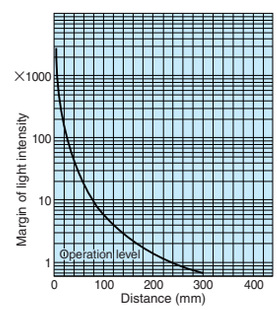
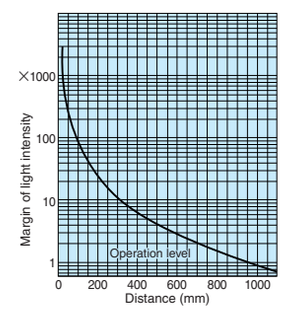


FTSV5BC

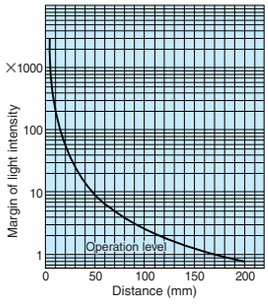


FTV7BC
FTV74BC

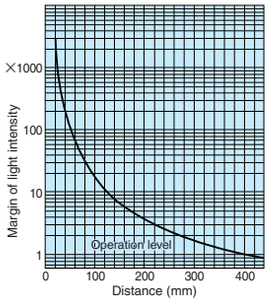


Distance-Output Characteristics (Typical Example) with F70R/F70AR

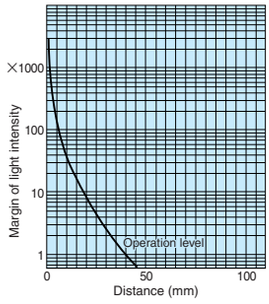
FTSV82BC



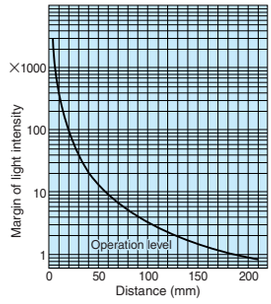
FTSV73BC



FTSV93BC



FTL706BC



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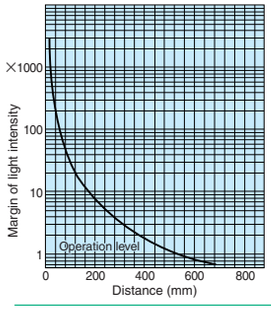
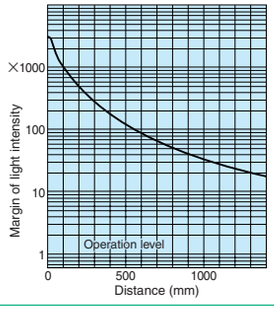
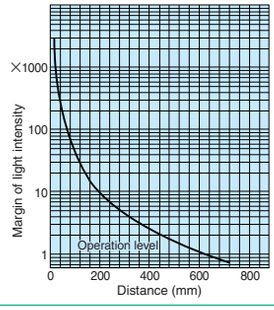


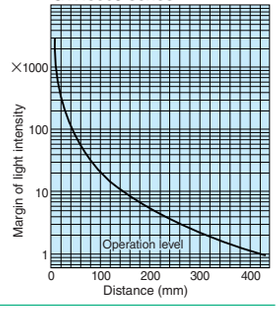
FTVW7YBC



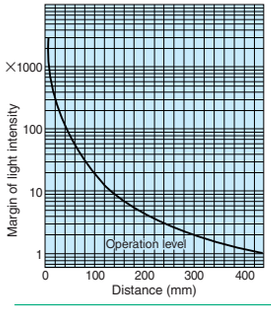
FT704BC



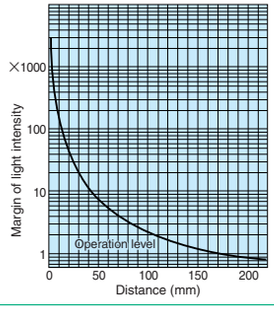
GLT500J series
GT500J series
GTH500J series



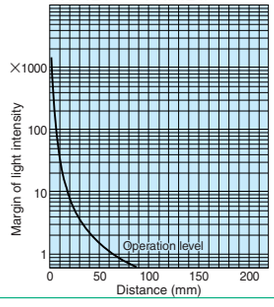
FR105BC



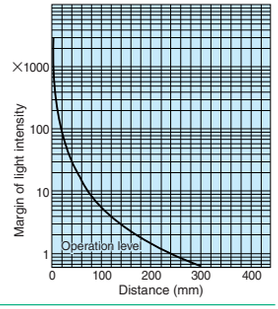
FR8EBC



FR8BC FRS53BC
FRS5BC FRS84BC
FRS83BC FRS8BC
FR84BC FR83BC



FR5BC FRH7BC
FR7BC



FR108BC
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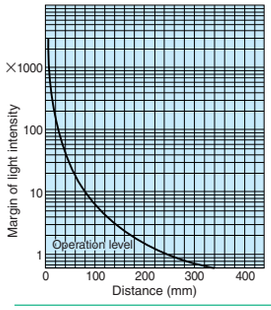
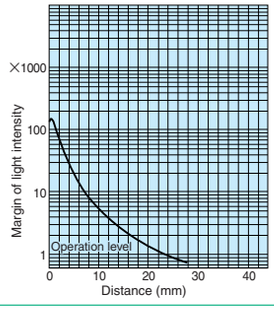
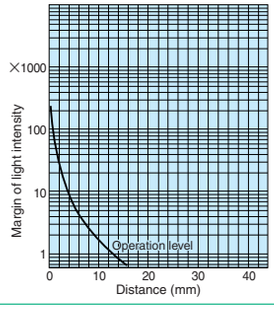


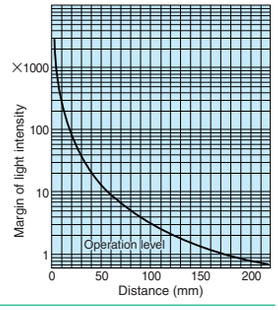
FR19YBC



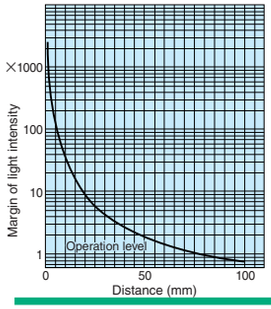
FR8YBC



FR7YBC
FR5YBC



FXN84BC



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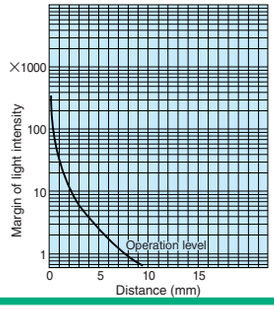
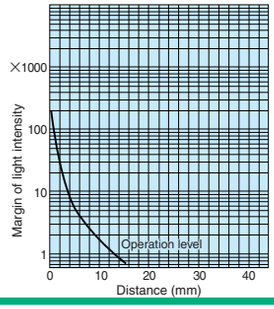
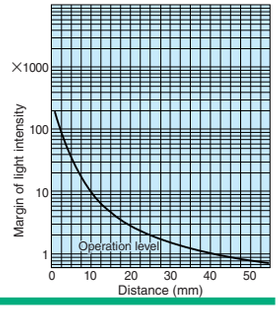


FRS200J series
FRS2003J series



FRSV8BC
FRSV83BC



Fiber Optic Cables

Distance-Output Characteristics (Typical Example) with F70R, F70AR

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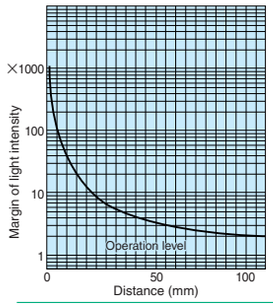
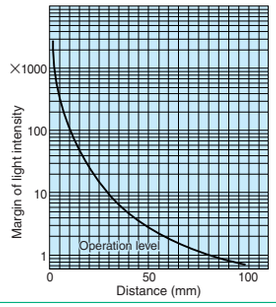
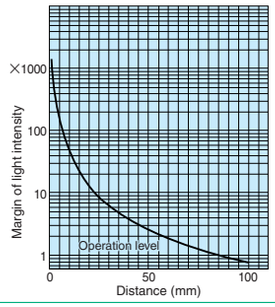
FRSV55BC



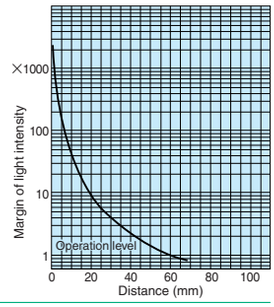
FX801BC
FX8404BC



FX200J series



FX83BC FX8401BC
FX84BC



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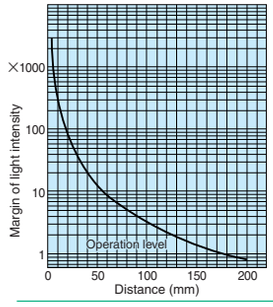
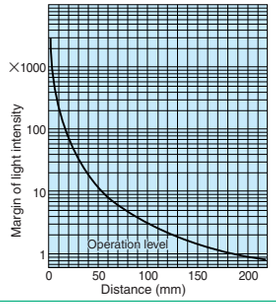


FX7BC



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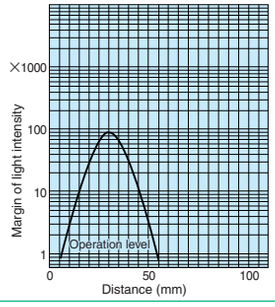

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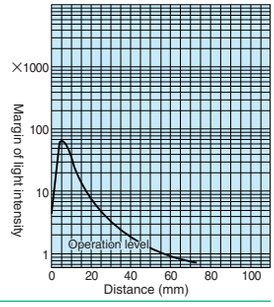
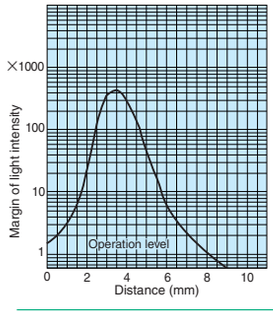
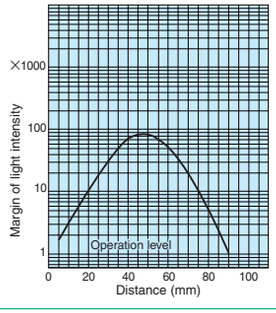


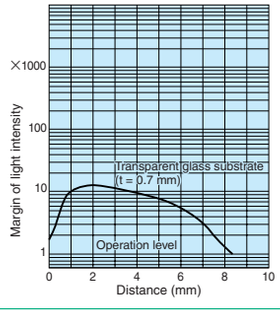
FZ802BC



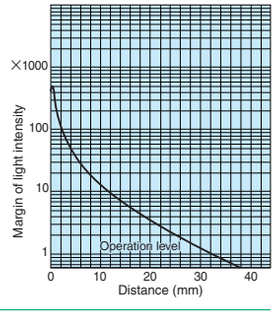
FZ1901YBC



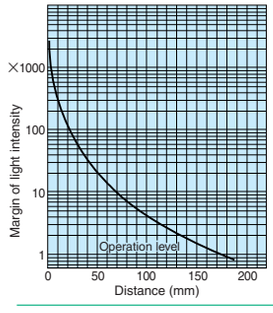
FZV191YBC



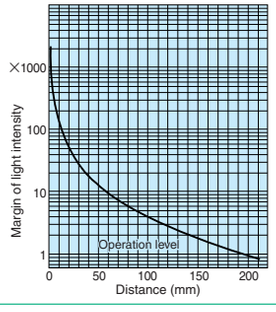
FRLV816BC



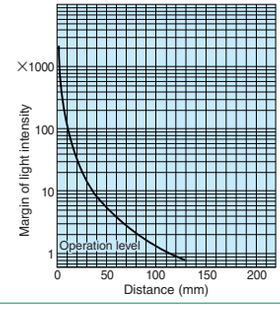
FRL7W16BC



FRL732BC
FRLV732BC

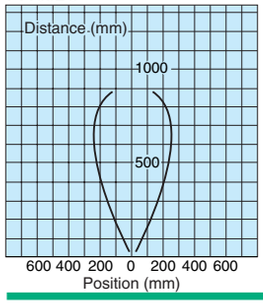


GLX500J series
GXH500J series
GX500J series

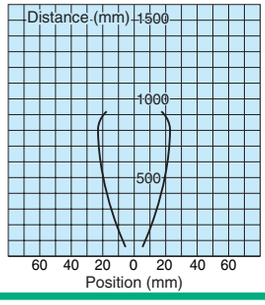


Directional Characteristics (Typical Example) with F71R

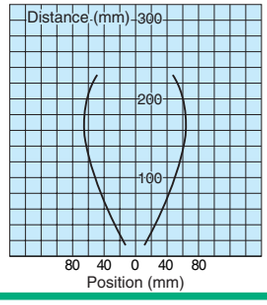
FT105BC



FT7202BC



FT8EBC



FT8BC FT81BC
FTS8BC FTS5BC
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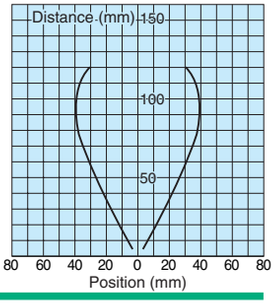
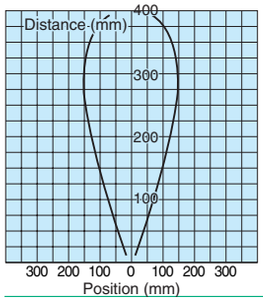
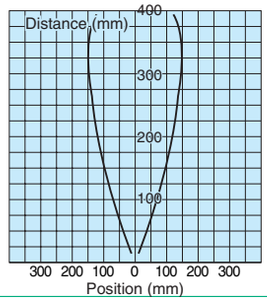


Directional Characteristics (Typical Example) with F71R

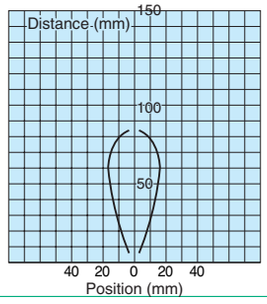
FT108BC



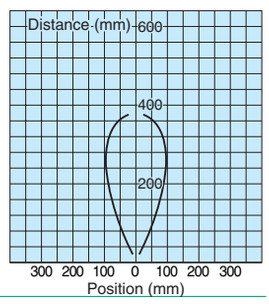
FT5BC FT7BC
FT3BC FTH7BC



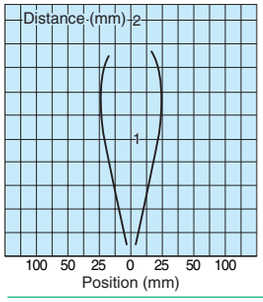
FT19YBC



FT5YBC



FTN5BC



FTVN5BC
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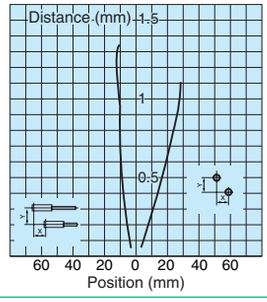
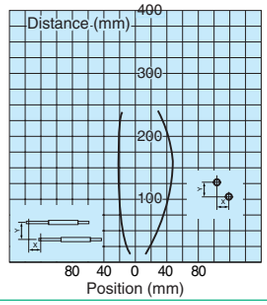
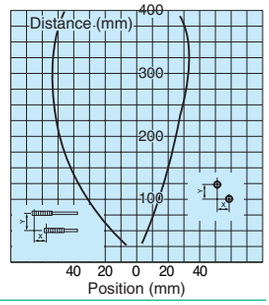


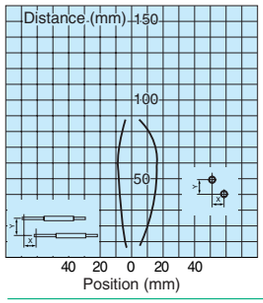
FTSV5BC



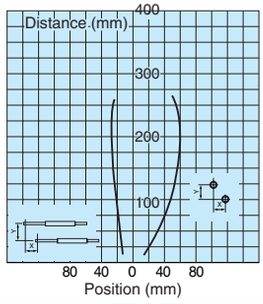
FTV7BC
FTV74BC



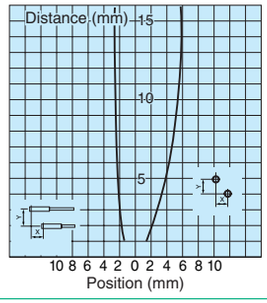
FTSV82BC



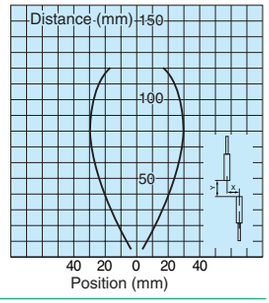
FTSV73BC



FTSV93BC



FTL706BC



FTL716BC
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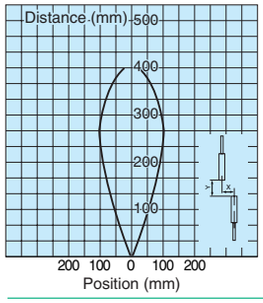

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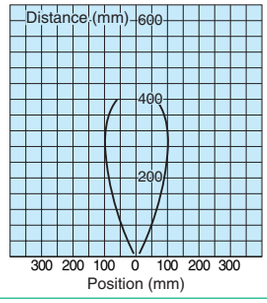
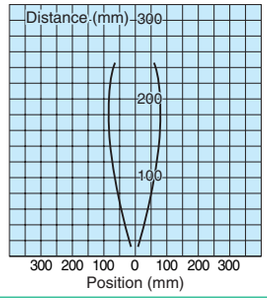
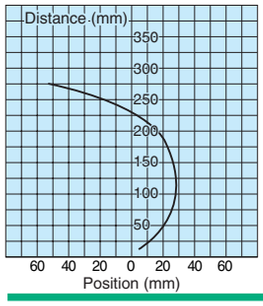


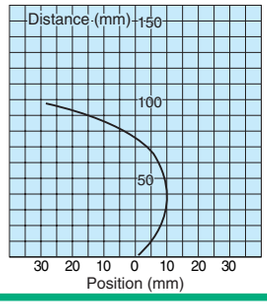
GLT500J series
GT500J series
GTH500J series



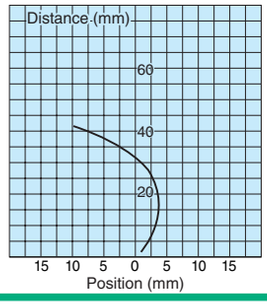
FR105BC



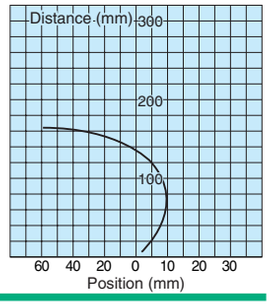
FR8EBC



FR8BC FRS53BC
FRS5BC FRS84BC
FRS83BC FRS8BC
FR84BC FR83BC



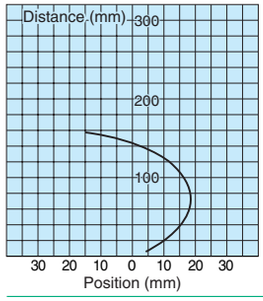
FR5BC FRH7BC
FR7BC



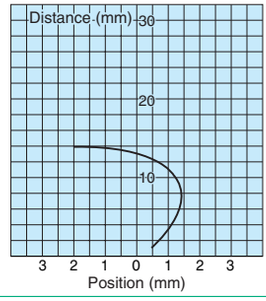
Fiber Optic Cables

Directional Characteristics (Typical Example) with F71R

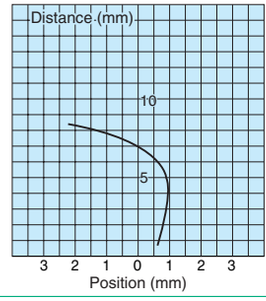
FR108BC
FR1083BC



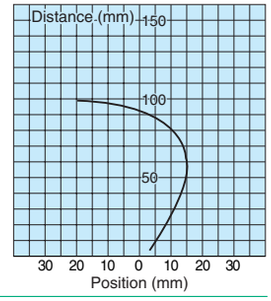
FR19YBC



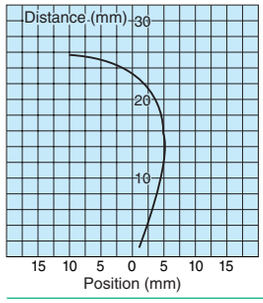
FR8YBC



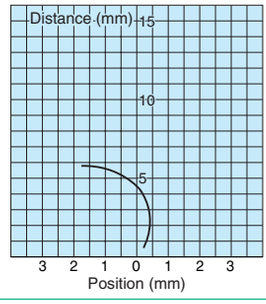
FR7YBC
FR5YBC



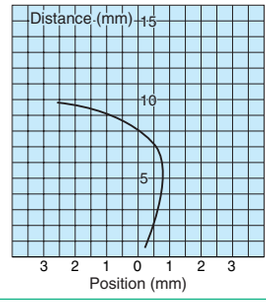
FXN84BC



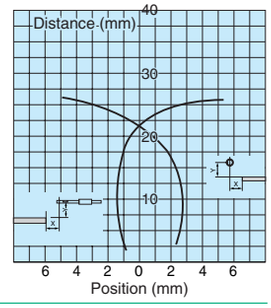
FXN841BC



FRS200J series
FRS2003J series



FRSV8BC
FRSV83BC



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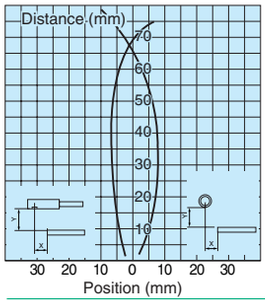
FRSV55BC



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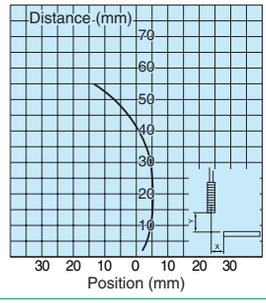
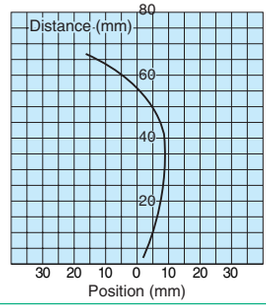
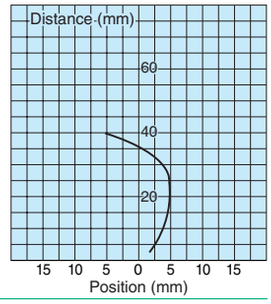
FX8404BC



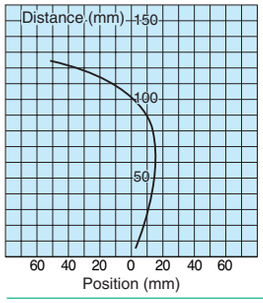
FX200J series



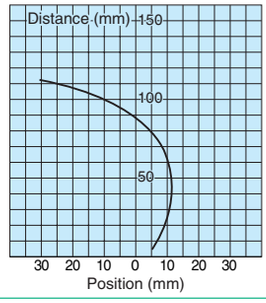
FX83BC FX8401BC
FX84BC



FX716BC



FX7BC



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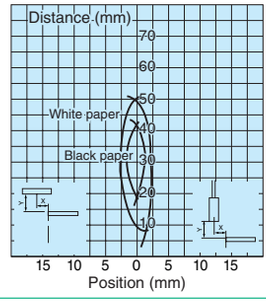

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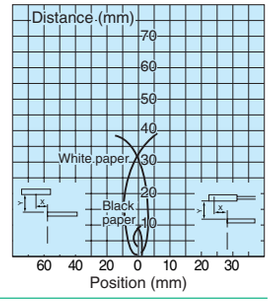

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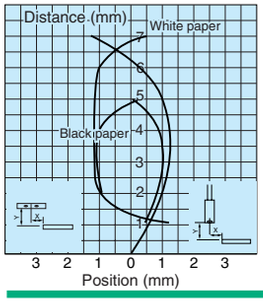
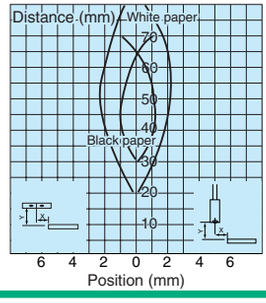


FZ1901YBC



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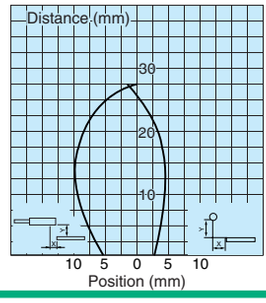

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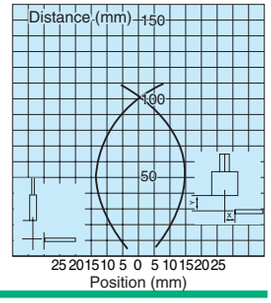

Directional Characteristics (Typical Example) with F71R

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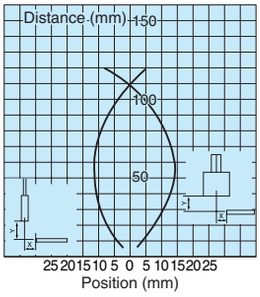
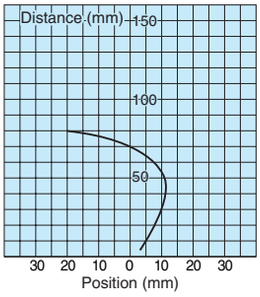
FRLV732BC

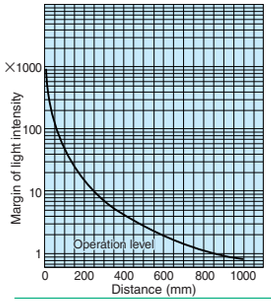


GLX500J series
GXH500J series
GX500J series



Distance-Output Characteristics (Typical Example) with F71R

FT105BC



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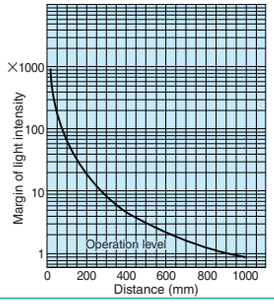
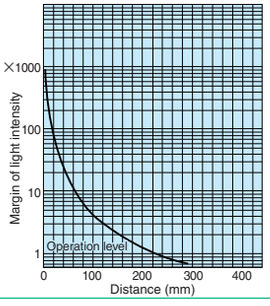
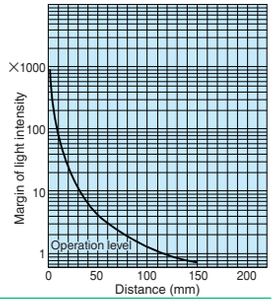


FT8EBC



FT8BC FTS5BC
FTS8BC FTS53BC
FTS88BC FT81BC



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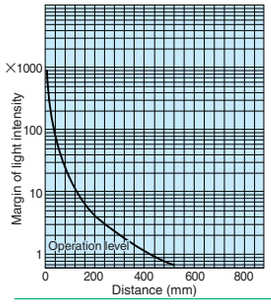
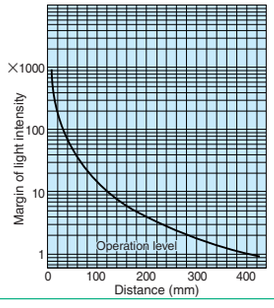
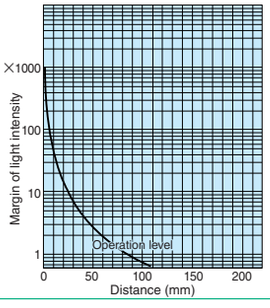


FT5BC FT7BC
FT3BC FTH7BC



FT19YBC



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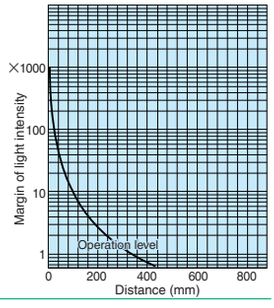

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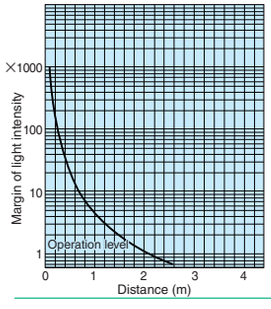

FTVN5BC
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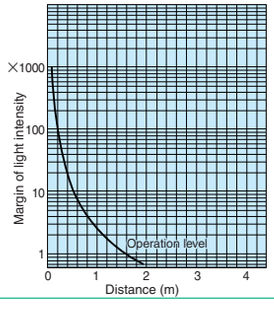

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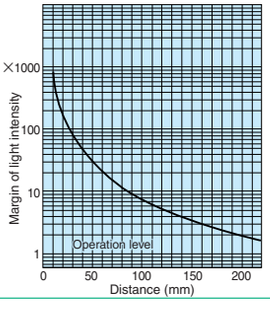

FTV7BC
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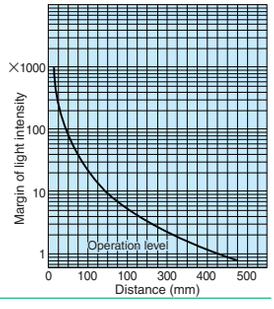

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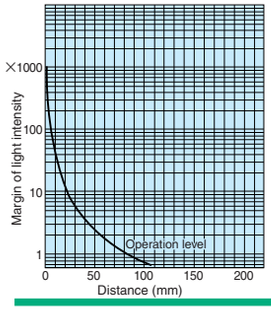

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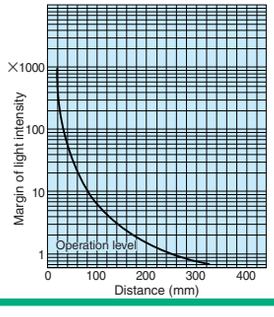

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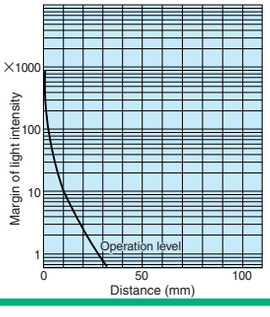

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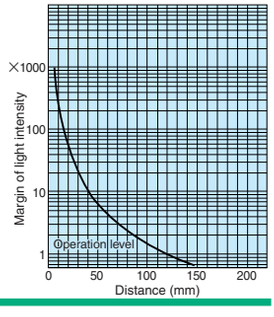

Fiber Optic Cables

Distance-Output Characteristics (Typical Example) with F71R

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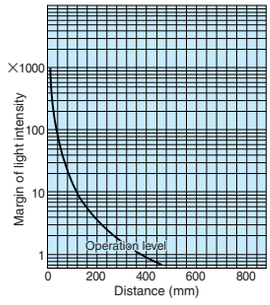
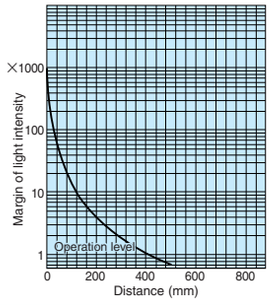
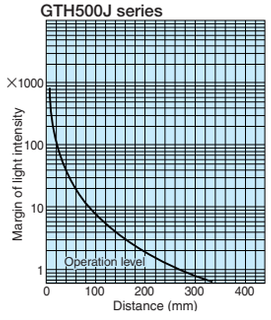
FTL7165BC



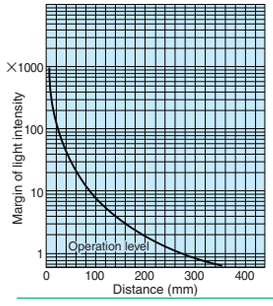
FT704BC



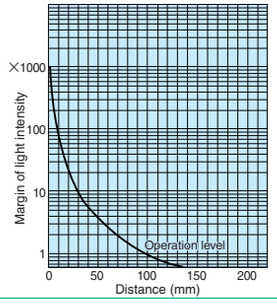
GLT500J series
GT500J series
GTH500J series



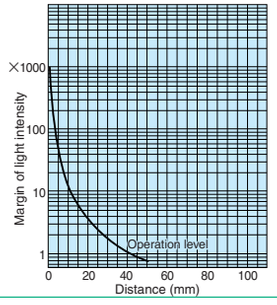
FR105BC



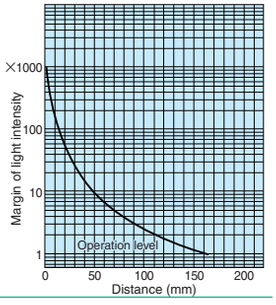
FR8EBC



FR8BC FRS53BC
FRS5BC FRS84BC
FRS83BC FRS8BC
FR84BC FR83BC



FR5BC FRH7BC
FR7BC



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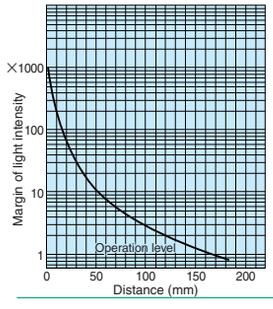
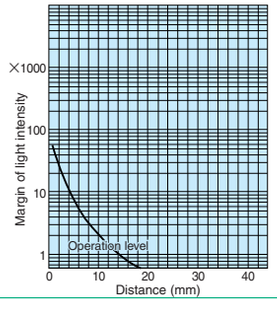
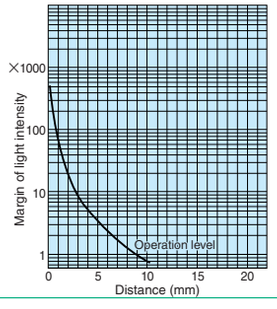


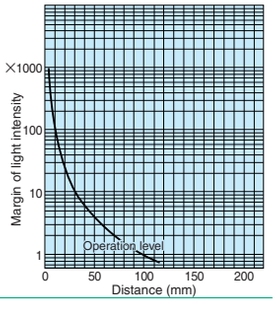
FR19YBC



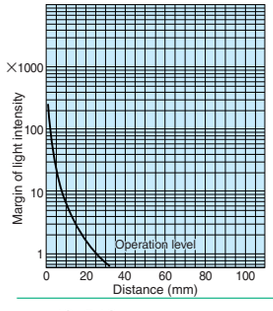
FR8YBC



FR7YBC
FR5YBC



FXN84BC



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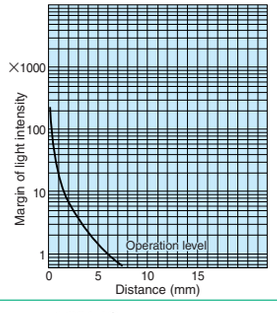
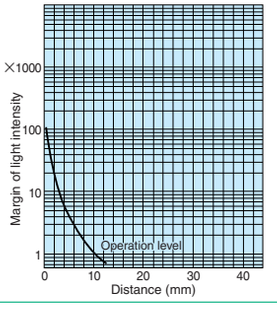
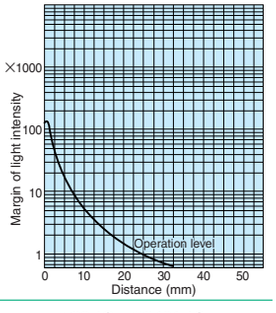


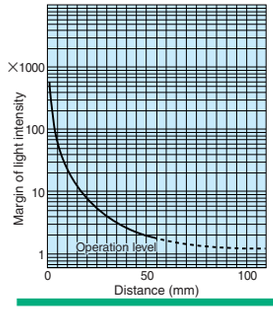
FRS200J series
FRS2003J series



FRSV8BC
FRSV83BC



FRSV5BC
FRSV55BC



FX801BC
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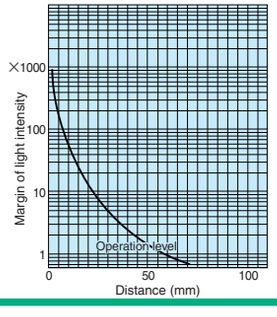
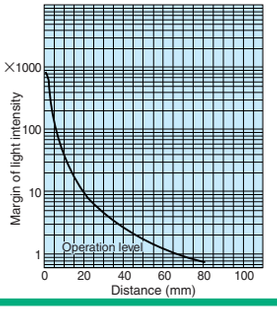


FX200J series



FX83BC FX8401BC
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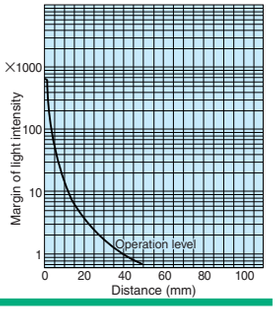
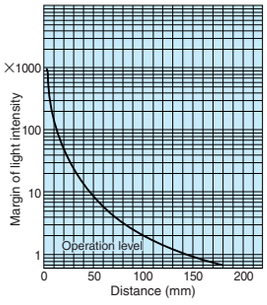
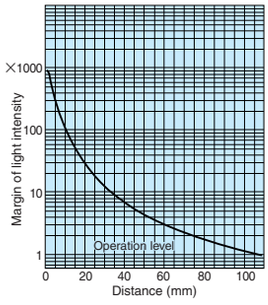


Distance-Output Characteristics (Typical Example) with F71R

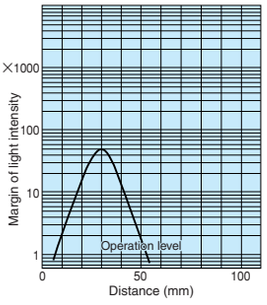
FX716BC



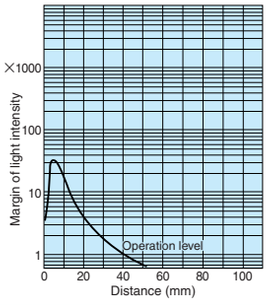
FX7BC



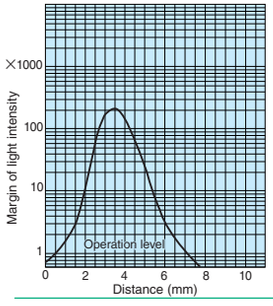
FZ801BC



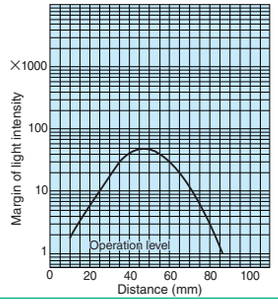
FZV8301BC



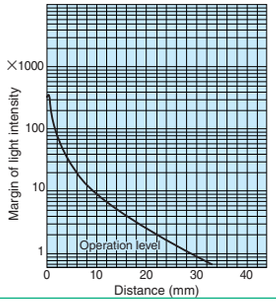
FZ802BC



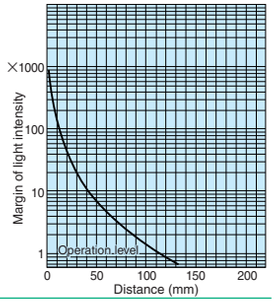
FZ1901YBC



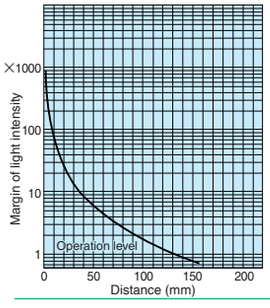
FRLV816BC



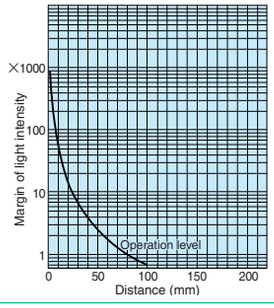
FRL7W16BC



FRL732BC
FRLV732BC



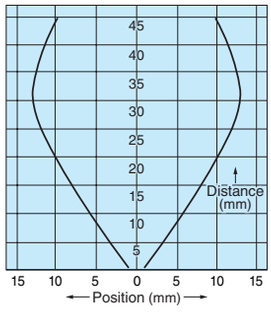
GLX500J series
GXH500J series
GX500J series



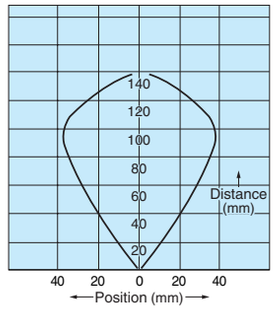
Fiber Optic Cables

Directional Characteristics (Typical Example) with F2R

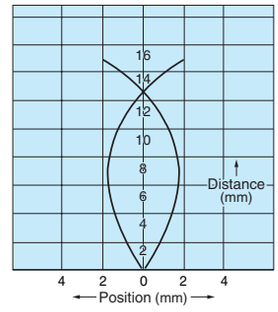
FT8BC FTS5BC FTS8BC FTS53BC FTS88BC



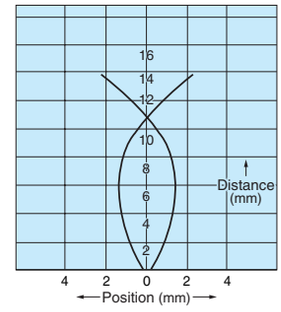
FT7BC FTH7BC FT5BC



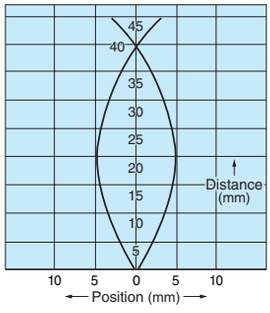
FR8BC FRS83BC FR83BC FRS84BC FR84BC FRS5BC FRS8BC FRS53BC



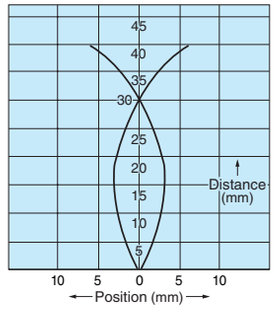
FX83BC FX84BC



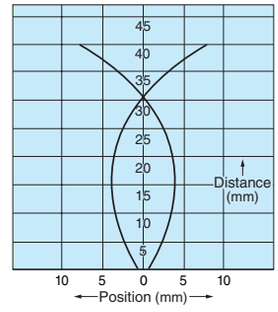
FR7BC FR5BC



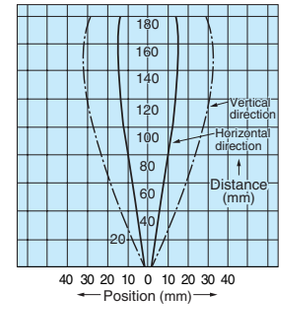
FRH7BC



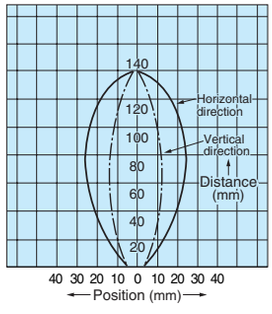
FX7BC



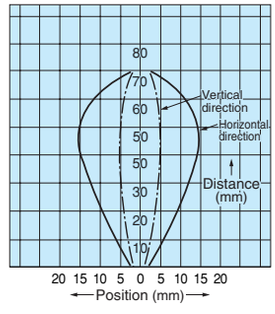
FTV74BC FTV7BC



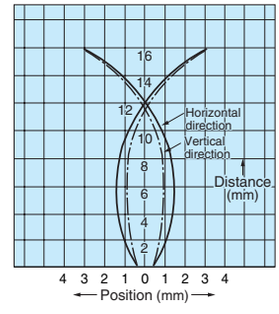
FTSV5BC



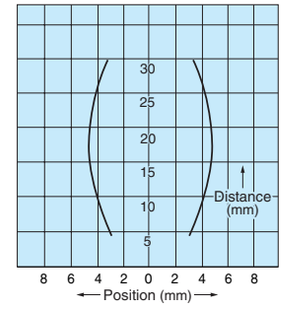
FTSV73BC



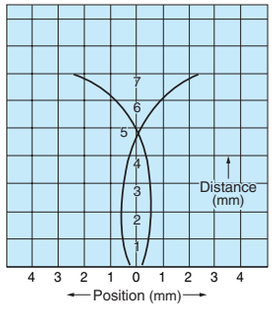
FRSV5BC FRSV55BC



FTSV82BC

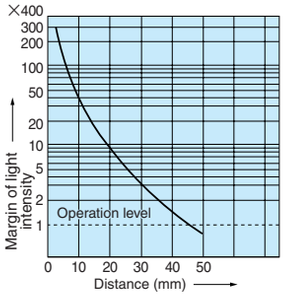


FRSV83BC

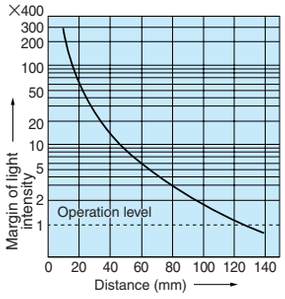


Distance-Output Characteristics (Typical Example) with F2R

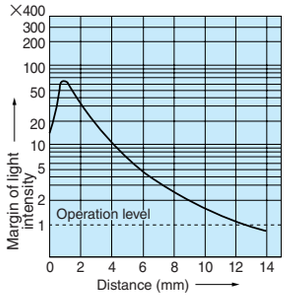
FT8BC FTS5BC
FTS8BC FTS53BC
FTS88BC



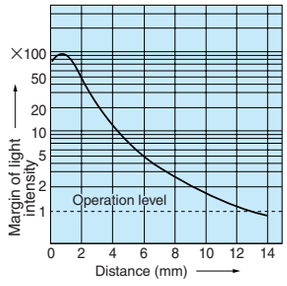
FT7BC
FTH7BC
FT5BC



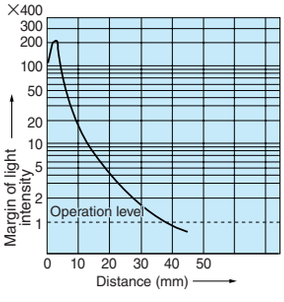
FR8BC FRS8BC FRS5BC
FR83BC FRS83BC FRS53BC
FR84BC FRS84BC



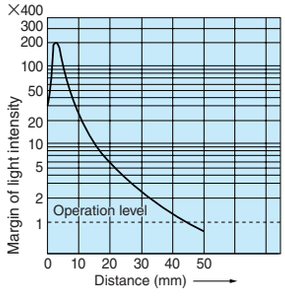
FX83BC
FX84BC



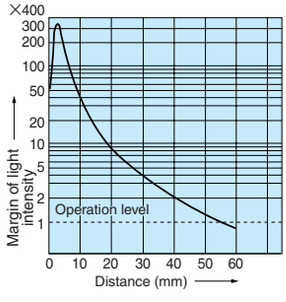
FX7BC



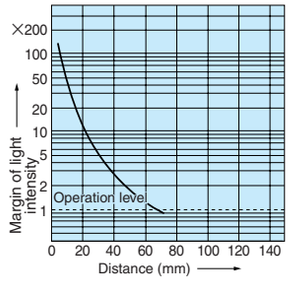
FRH7BC



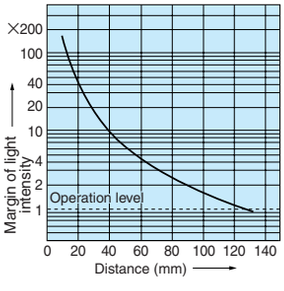
FR7BC



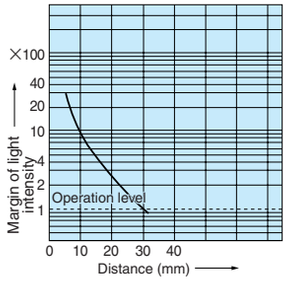
FTSV73BC



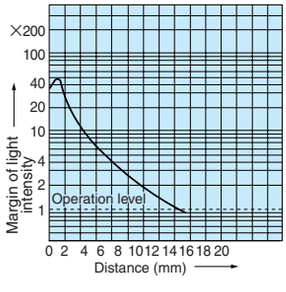
FTSV5BC



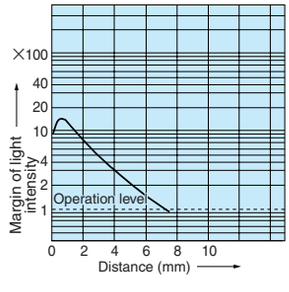
FTSV82BC



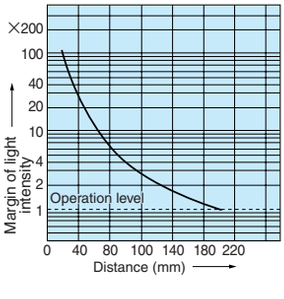
FRSV5BC
FRSV55BC



FTSV83BC

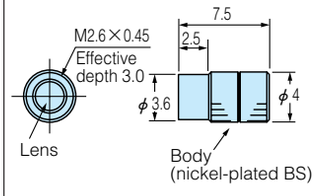
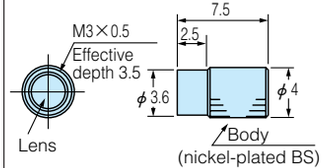
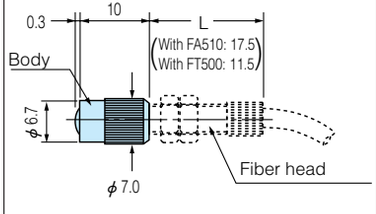
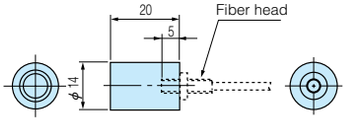
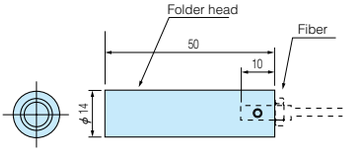
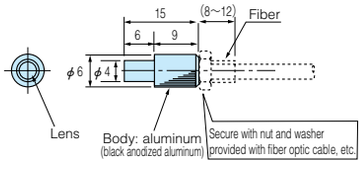


FTV74BC
FTV7BC

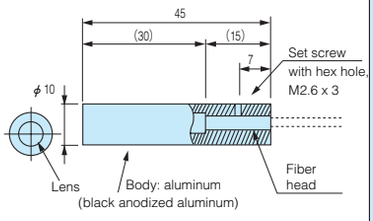
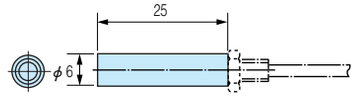
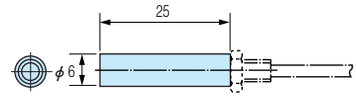
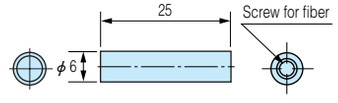
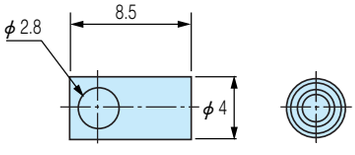
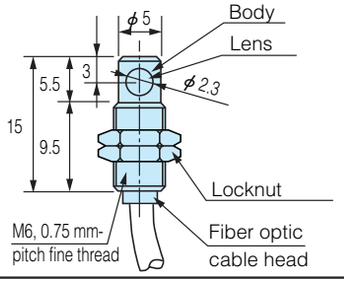


Fiber Optic Cables

Attachments

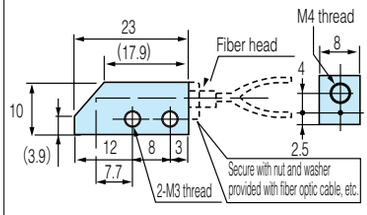
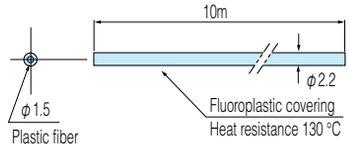
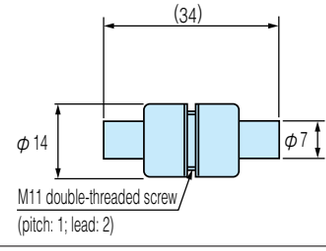
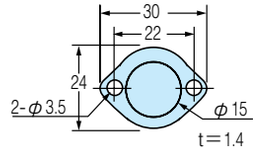
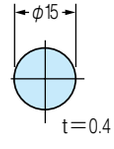
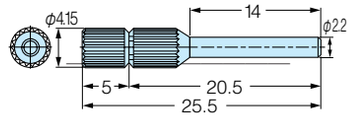
Type/Model	Description	Dimensions (mm)	Remarks
Lens unit **FA714** 	• For fiber optic cable with two-tiered screw And M2.6 tip • Does not apply to reflective types		• Detecting distance (mm) Amplifier / Fiber optic cable: F8OR (Long-distance / High-speed), F70R F70AR, F71R, F2R FT7BC: 3400 / 1900 / 1900 / 1150 / 500 FTH7BC: 3400 / 1900 / 1900 / 1150 / 500 (With lens attached to transmitter and receiver)
FA814 	• For fiber optic cables with M3, 0.5 mm-pitch screw • Does not apply to reflective types		• Detecting distance (mm) Amplifier / Fiber optic cable: F8OR (Long-distance / High-speed), F70R F70AR, F71R, F2R FT8EBC: 3400 / 1900 / 1900 / 1200 / 500 FT8BC: 3400 / 1900 / 1900 / 1200 / 500 FT19YBC: 1000 / 570 / 570 / 350 / 120 FT108BC: 3400 / 1900 / 1900 / 1200 / 500 GTKseries: – / – / – / – / 450 (With lens attached to transmitter and receiver)
形式・FA514 	• For through-beam fiber optic cables with M4, 0.7 mm-pitch screw • Does not apply to reflective types • Increases sensing distance by 10 times (with ϕ1.0 fiber optic cable core)		Also applicable to fiber optic cables with ϕ0.5, 1.0 or 1.5 core.
FA205 	• For through-beam fiber optic cables with M4, 0.7 mm-pitch screw • Increases sensing distance by 20 times (with ϕ1.0 fiber optic cable core)		Also applicable to fiber optic cables with ϕ0.5, 1.0 or 1.5 core.
FA200 	• For coaxial reflective fiber optic cables with M4, 0.7 mm-pitch screw		Applicable fiber optic cable: FX**BC and FX200J Series excluding FX801BC Detecting distance: 10-11 mm / Spot diameter: 0.5-0.3 mm
FA240 			Detecting distance: 7-16 mm Spot diameter: 0.6-1.7 mm

Attachments

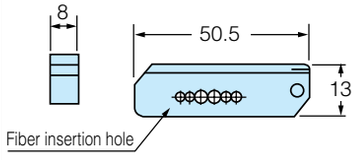
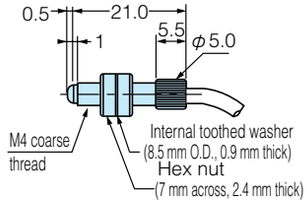
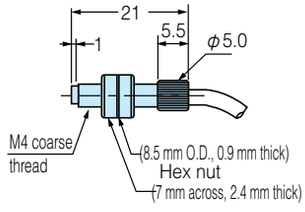
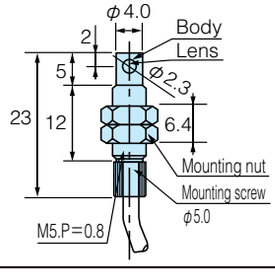
	Type/Model	Description	Dimensions (mm)	Remarks	
Lens unit	**FA250** 	• For coaxial reflective fiber optic cables with M4, 0.7 mm-pitch screw		Applicable fiber optic cable: Coaxial reflective FX**BC and FX200J Series excluding FX801BC	Detection distance: 18-25 mm Spot diameter: 0.4-0.7 mm
	FA260 				Detecting distance: 18 mm Spot diameter: approximately 0.5 mm
	FA263 				Detecting distance: 35 mm Spot diameter: approximately 1.5 mm
	FA261 	• For coaxial reflective fiber optic cables with M3, 0.5 mm-pitch screw		Applicable fiber optic cable: FX801BC	Detecting distance: 18 mm Spot diameter: approximately 0.5 mm
Side-view	**FA712** 	• For through-beam fiber optic cable with two-tiered M4 screw with M2.6 tip		Applicable fiber optic cable: fiber optic cables with two-tiered screw with M2.6 tip (FTH7BC, FT7BC)	Detecting distance not affected
	FA12F5 	• Attachable to through-beam fiber optic cable with M4, 0.7 mm-pitch screw for side-on use			Detecting distance not affected

Fiber Optic Cables

Attachments

Type/Model		Description	Dimensions (mm)	Remarks
Side-view	**FA252** 	• Attachable to reflective fiber optic cable with M4, 0.7 mm-pitch screw for side-on use		Detecting distances depend on the insertion length of fiber optic cables.
Heat-resistant fiber optic cable	**FA6001FE** 	• PFA-covered fiber optic cable allows use in high-temperature atmosphere of up to 130 ºC		Applicable to all amplifiers. Use the fiber optic cable attachment specified.
Relay connector	**FA7CN** 	• Convenient for extending fiber optic cables when they are broken, etc. (Use fiber optic cables with cores of the same diameter on both sides of the connector.)		Applicable fiber optic cable Outer diameter: 2.2 mm Core diameter: 1.0, 1.5mm
Reflector	**S-15B** 	• For use of fiber optic sensors in combination with reflectors. • Although reflectors increase detecting distances, the sensitivity must be reduced for preventing false detection due to diffuse reflection.		With base Mount by screwing or with adhesive
	S-15 			Without base Mount with adhesive
Adapter	Model FA191BC (gray): ϕ1 Model FA181BC (black): ϕ1.25 	• Adapters for small-diameter fiber optic cables.		Applicable amplifiers F2R Series F71 Series F70 Series F80R Series

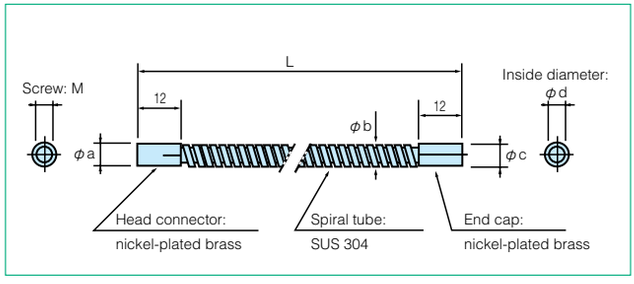
Attachments

	Type/Model	Description	Dimensions (mm)	Remarks	
Fiber cutter	**FA500** 	• Cuts fiber optic cable to an arbitrary length according to the installation situation.		Be sure to cut one cable at a time and use one hole of cutter once only.	
Fiber optic cable attachment	**Model・FA511** 	• Lens unit for through-beam fiber optic cables.		Applicable fiber optic cable Outer diameter: 2.2 mm Core diameter: 0.5, 1.0, 1.5mm	For longer detecting distances
	Model・FA510 	• Head without lens for through-beam fiber optic cables.			—
	Model・FA512 	• Side-view unit for through-beam fiber optic cables.			Detecting distance not affected

Fiber Protector

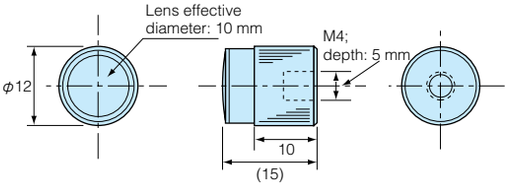
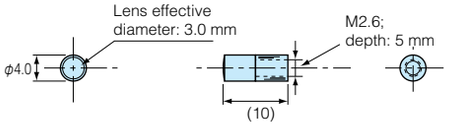
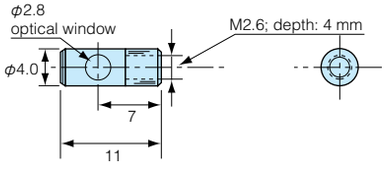
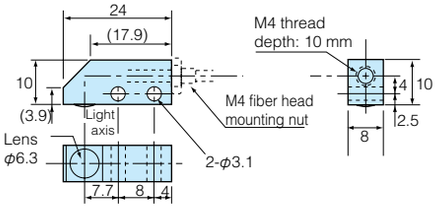
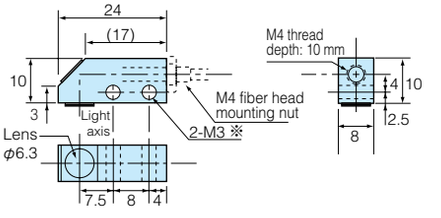
Model		FA3SP10	FA4SP10	FA6SP10
Dimensions	Length：Lmm	1000mm		
	ϕa	ϕ6.0		ϕ8.5
	ϕb	ϕ4.8		ϕ7.0
	ϕc	ϕ6.0		ϕ8.5
	ϕd	ϕ3.0		ϕ5.0
	Screw: M	M3x0.5 Depth: 4	M4x0.7 Depth:4	M6x0.75 Depth:4
Applicable fiber optic cable		FT8BC FT8EBC FTS8BC FTS88BC	FT5BC FT7BC FTH7BC FTS5BC FTS53BC FTSV5BC FR84BC FRS84BC FX84BC	FR7BC FRH7BC FX7BC
Allowable bending radius		R30 mm min.		
Tensile strength (at normal temperature)		1.5 N·m between tube and head connector, end cap, tube (2.0 N·m)		
Compressive load		Tube: 30 N		

Dimensions (in mm)



Fiber Optic Cables

Attachments

	Type/Model	Description	Dimensions (mm)	Remarks
Lens unit	**FA515** 	• Round for M4 screw		Body: SUS304 Lens: Glass Upper temperature limit: 350°C
	FA714H 	• Round for M2.6 screw		Body: SUS304 Lens: Glass Upper temperature limit: 350°C
	FA712H 	• Round side-view for M2.6 screw		Body: SUS304 Lens: Glass Upper temperature limit: 350°C
	FA252M 	• Square side-view for M4 screw		Body: SUS304 Lens: Glass Upper temperature limit: 200°C
	FA252H-□※ 			Body: SUS304 Lens: Glass Upper temperature limit: 350°C * -B ϕ3.1