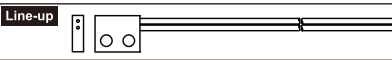
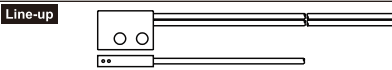
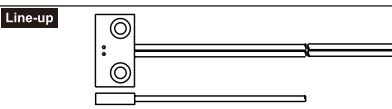
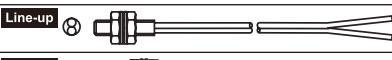
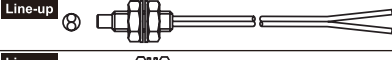
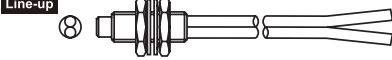
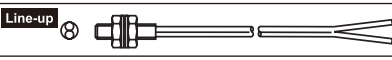



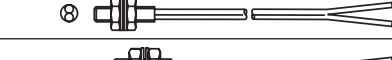

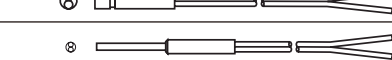






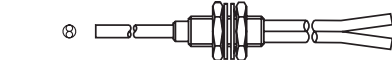




# Fiber Optic Cable

## Specifications (diffuse reflective type)

(based on Non-glossy white paper)

Type	Appearance	Feature	Model	Sensing distance (mm)	Min. sensing target <sup>※3</sup>	Allowable bend radius	Cable length(L) <sup>※4</sup>	Temp.
Flexible type <sup>※5</sup>		Flat type /Top view	FDFU-210-05R	35 <sup>※1</sup>	Ø0.0125	R1	1m <b>Free cut</b>	-40 to 60°C
		Flat type /Side view	FDFN-210-05R	30 <sup>※1</sup>				
		Flat type /Flat view	FDF-210-05R	35 <sup>※1</sup>				
		M3 Bolt	FD-320-05R	35 <sup>※1</sup>				
		M4 Bolt	FD-420-05R	130 <sup>※1</sup>				
		M6 Bolt	FD-620-10R	130 <sup>※1</sup>				
Break-resistant type <sup>※5</sup>		M3 Bolt	FD-320-06B	35 <sup>※2</sup>	Ø0.0125	R5	2m <b>Free cut</b>	-40 to 70°C
		Ø3 Cylinder type	FDC-320-06B					
		M4 Bolt	FD-420-06B					
		M6 Bolt	FD-620-13B	100 <sup>※2</sup>				
Standard type		M3 Bolt	FD-320-05	40 <sup>※2</sup>	Ø0.03	R15	2m <b>Free cut</b>	-40 to 70°C
		M4 Bolt	FD-420-05					
		Ø3 Cylinder type	FDC-320-05					
		Ø3 Cylinder type SUS type(90mm)	FDCS-320-05					
		M3 Bolt SUS type(90mm)	FDS-320-05					
		M3 Bolt SUS type(45mm)	FDS2-320-05					
		M4 Bolt SUS type(90mm)	FDS-420-05					
		M4 Bolt SUS type(45mm)	FDS2-420-05					
		M6 Bolt	FD-620-10	120 <sup>※2</sup>		R30		
	M6 Bolt SUS type(90mm)	FDS-620-10						
	M6 Bolt SUS type(45mm)	FDS2-620-10						
	Plastic	FDP-320-10		R30				

※1: The sensing distance is a standard for BF5 Series.

※2: The sensing distance is a standard for red LED of BF4 Series and 10% of red LED is applied when it is green LED. It is applied to 40% of sensing distance for BF3RX.

※3: Min. sensing target is a value measured opaque material in accurate output status and the sensing distance is different with the rated sensing distance ※2.

※4: Fiber optic cable out of the rated length can be customizable.

※5: **Flexible optical fiber (Multi core)** : A large number of ultra-fine cores are all surrounded by cladding. Easy to install the many places where are bending areas because the change of the intensity of radiation by bending is small.

• **Break-resistant optical fiber** : The fiber units contain a large number of independent fine fibers, ensuring a high degree of flexibility. It can be used for moving parts(robot hand) and it is not easily broken.

※ **Free cut** The sensing distance can be shortened about max. 20% than the normal according to condition of the cable. [(FC-2) should be used for cutting fiber cable.]

(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/Socket

(H) Temp. controller

(I) SSR/Power controller

(J) Counter

(K) Timer

(L) Panel meter

(M) Tacho/Speed/Pulse meter

(N) Display unit

(O) Sensor controller

(P) Switching mode power supply

(Q) Stepper motor& Driver&Controller

(R) Graphic/Logic panel

(S) Field network device

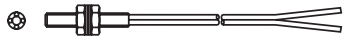
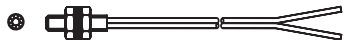
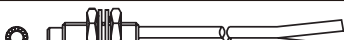
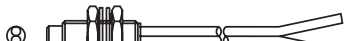
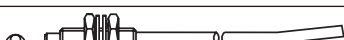

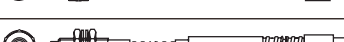
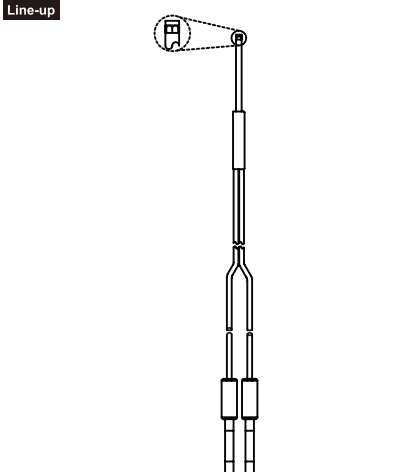
(T) Software

(U) Other

# Fiber Optic Cable

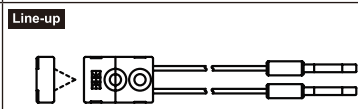
## ■ Specifications (diffuse reflective type)

(based on Non-glossy white paper)

Type	Appearance	Feature	Model	Sensing distance (mm)	Min. sensing target <sup>※3</sup>	Allowable bend radius	Cable length(L) <sup>※4</sup>	Temp.
Coaxial type		M3 Bolt	<b>FD-320-F</b>	40 <sup>※2</sup>	Ø0.03	R15	2m <b>Free cut</b>	-40 to 70°C
		M3 Bolt	<b>FD-320-F1</b>	60 <sup>※2</sup>				
		M6 Bolt	<b>FD-620-F2</b>	120 <sup>※2</sup>		R30		
Heat-resistant type		M6 Bolt	<b>FD-620-10H</b>			160 <sup>※2</sup>		R30
		M6 Bolt	<b>FD-620-15H1</b>	R50				-40 to 150°C
		M4 Bolt Glass type	<b>GD-420-20H2</b>	100 <sup>※2</sup>		R50		2m
		M4 Bolt Glass type	<b>GD-620-20H2</b>					
Side view		Ø3 Cylinder type	<b>FDCSN-320-05</b>	30 <sup>※1</sup>	Ø0.0125	R15	2m	-40 to 60°C

## ■ Specifications (convergent reflective type)

(based on Non-glossy white paper)

Type	Appearance	Feature	Model	Sensing distance (mm)	Min. sensing target <sup>※3</sup>	Allowable bend radius	Cable length(L) <sup>※4</sup>	Temp.
Convergent reflective type		Convergent reflective type	<b>FLF-320-10</b>	8 <sup>※1</sup>	Ø0.0125	R25	2m	-40 to 60°C

※1: The sensing distance is a standard for BF5 Series.

※2: The sensing distance is a standard for red LED of BF4 Series and 10% of red LED is applied when it is green LED. It is applied to 40% of sensing distance for BF3RX.

※3: Min. sensing target is a value measured opaque material in accurate output status and the sensing distance is different with the rated sensing distance ※2.

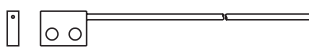
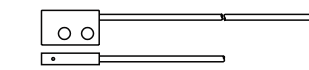

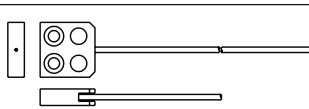
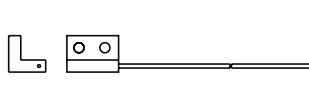
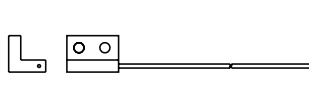
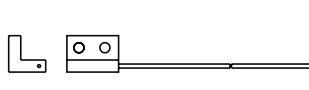

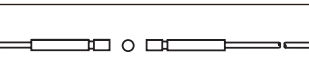
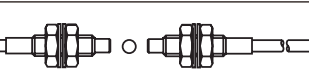

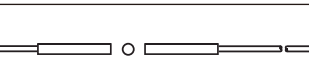

※4: Fiber optic cable out of the rated length can be customizable.

※ **Free cut** The sensing distance can be shortened about max. 20% than the normal according to condition of the cable. [(FC-2) should be used for cutting fiber cable.]

※ **Glass type** is for BF5R, BF4R Series.

## ■ Specifications (through-beam type)

(based on Non-glossy white paper)

Type	Appearance	Feature	Model	Sensing distance (mm)	Min. sensing target <sup>※3</sup>	Allowable bend radius	Cable length(L) <sup>※4</sup>	Temp.
Flexible type <sup>※5</sup>	<b>Line-up</b> 	Flat type /Top view	<b>FTFU-210-05R</b>	110 <sup>※1</sup>			1m	
	<b>Line-up</b> 	Flat type /Side view	<b>FTFN-210-05R</b>					
	<b>Line-up</b> 	Flat type /Flat view	<b>FTF-210-05R</b>	100 <sup>※1</sup>	∅0.04	R1	Free cut	
	<b>Line-up</b> 	Flat type /Top+Side view	<b>FTFB-210-05R</b>	110 <sup>※1</sup>				
	<b>Line-up</b> 	Integrated bracket(L type) /Top view	<b>FTLU-310-10R</b>	500 <sup>※1</sup>	∅0.06			
	<b>Line-up</b> 		<b>FTLU1-310-10R</b>					
	<b>Line-up</b> 		<b>FTLU2-310-10R</b>					
	<b>Line-up</b> 	M3 Bolt	<b>FT-320-05R</b>	110 <sup>※1</sup>	∅0.3			-40 to 60°C
<b>Line-up</b> 	∅2 Cylinder type	<b>FTC-220-05R</b>						
<b>Line-up</b> 	M4 Bolt	<b>FT-420-10R</b>	500 <sup>※1</sup>	∅0.5		2m		
Flexible type <sup>※5</sup>	<b>Line-up</b> 	M3 Bolt	<b>FT-320-06B</b>	110 <sup>※2</sup>	∅0.3		Free cut	
	<b>Line-up</b> 	∅1.5 Cylinder type	<b>FTC-1520-06B</b>					
	<b>Line-up</b> 	M4 Bolt	<b>FT-420-13B</b>	400 <sup>※2</sup>	∅0.6	R5		

※1: The sensing distance is a standard for BF5 Series.

※2: The sensing distance is a standard for red LED of BF4 Series and 10% of red LED is applied when it is green LED. It is applied to 40% of sensing distance for BF3RX.

※3: Min. sensing target is a value measured opaque material in accurate output status and the sensing distance is different with the rated sensing distance ※2.

※4: Fiber optic cable out of the rated length can be customizable.

※5: ● **Flexible optical fiber (Multi core)** : A large number of ultra-fine cores are all surrounded by cladding. Easy to install the many places where are bending areas because the change of the intensity of radiation by bending is small.

● **Break-resistant optical fiber** : The fiber units contain a large number of independent fine fibers, ensuring a high degree of flexibility. It can be used for moving parts(robot hand) and it is not easily broken.

※ **Free cut** The sensing distance can be shortened about max. 20% than the normal according to condition of the cable. [(FC-2) should be used for cutting fiber cable.]

※FT-420-13 was discontinued. FT-420-13B is replacement.

(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/ Socket

(H) Temp. controller

(I) SSR/ Power controller

(J) Counter

(K) Timer

(L) Panel meter

(M) Tacho/ Speed/ Pulse meter

(N) Display unit

(O) Sensor controller

(P) Switching mode power supply

(Q) Stepper motor& Driver&Controller

(R) Graphic/ Logic panel

(S) Field network device

(T) Software

(U) Other

# Fiber Optic Cable

## ■ Specifications (through-beam type)

(based on Non-glossy white paper)

Type	Appearance	Feature	Model	Sensing distance (mm)	Min. sensing target <sup>※3</sup>	Allowable bend radius	Cable length(L) <sup>※4</sup>	Temp.					
Standard type		M3 Bolt	<b>FT-320-05</b>	150 <sup>※2</sup>	Ø0.5	R15	2m	-40 to 70°C					
	<b>Line-up</b> 	Ø1.5 Cylinder type	<b>FTC-1520-05</b>										
		Ø2 Cylinder type	<b>FTC-220-05</b>										
		Ø2 Cylinder type SUS type(90mm)	<b>FTCS-220-05</b>										
		M3 Bolt SUS type(90mm)	<b>FTS-320-05</b>										
		M3 Bolt SUS type(35mm)	<b>FTS1-320-05</b>										
		M3 Bolt SUS type(45mm)	<b>FTS2-320-05</b>										
		M4 Bolt	<b>FT-420-10</b>						500 <sup>※2</sup>	Ø1	R30	<b>Free cut</b>	
		Ø3 Cylinder type	<b>FTC-320-10</b>										
		Plastic	<b>FTP-320-10</b>										
	M4 Bolt SUS type(90mm)	<b>FTS-420-10</b>											
	M4 Bolt SUS type(45mm)	<b>FTS2-420-10</b>											
Heat-resistant type		M4 Bolt	<b>FT-420-10H</b>	300 <sup>※2</sup>		R30		-40 to 105°C					
		M4 Bolt	<b>FT-420-15H1</b>	500 <sup>※2</sup>		R50		-40 to 150°C					
		M4 Bolt Glass type	<b>GT-420-13H2</b>	400 <sup>※2</sup>		R25	2m	-40 to 50°C					
Side view	<b>Line-up</b> 	Ø2.47 Cylinder type	<b>FTCSN-2520-05</b>	120 <sup>※1</sup>	Ø0.0125	R15	2m	-40 to 60°C					

※1: The sensing distance is a standard for BF5 Series.

※2: The sensing distance is a standard for red LED of BF4 Series and 10% of red LED is applied when it is green LED. It is applied to 40% of sensing distance for BF3RX.

※3: Min. sensing target is a value measured opaque material in accurate output status and the sensing distance is different with the rated sensing distance ※2.

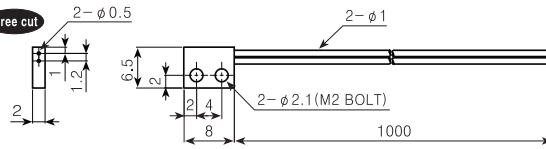
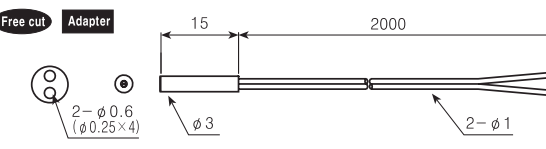
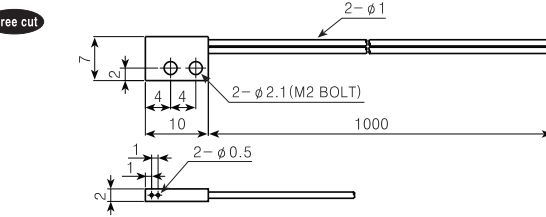
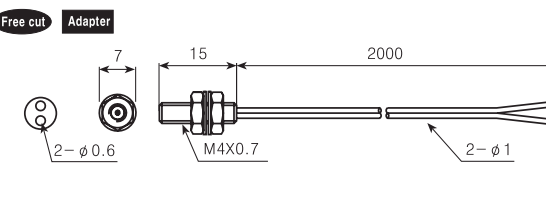
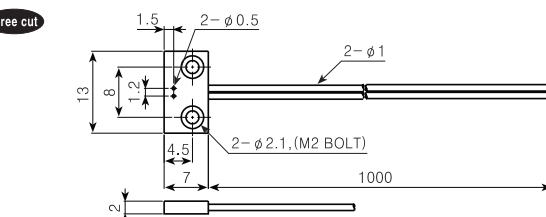
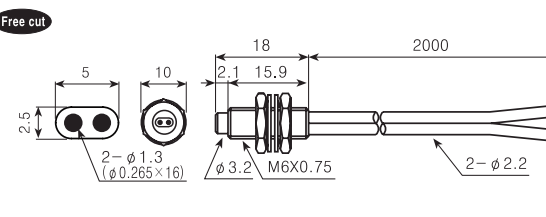
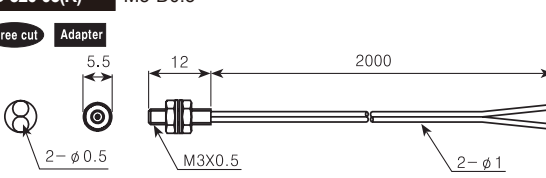
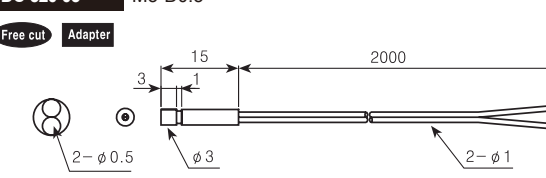
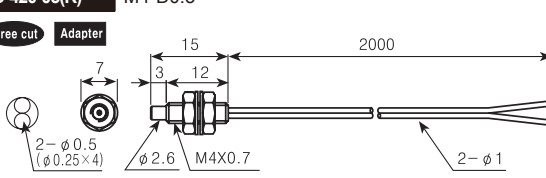
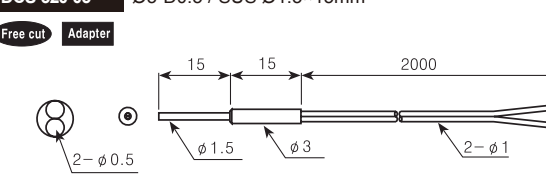
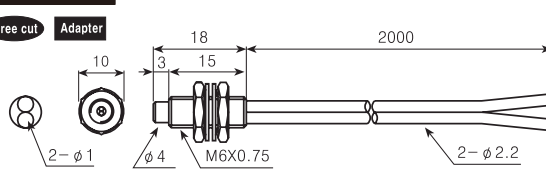
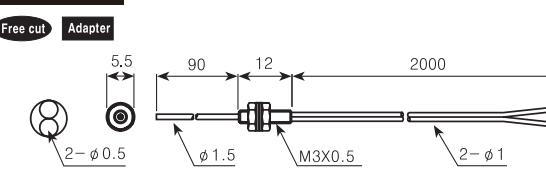
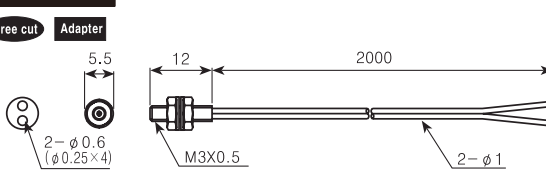
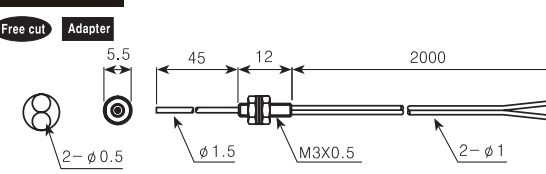
※4: Fiber optic cable out of the rated length can be customizable.

※ **Free cut**: The sensing distance can be shortened about max. 20% than the normal according to condition of the cable. [(FC-2) should be used for cutting fiber cable.]

※ **Glass type** is for BF5R, BF4R Series.

# Fiber Optic Cable

## ■ Dimensions

Model	Diffuse reflective type	Model	Diffuse reflective type
<b>FDU-210-05R</b>	M2-D0.5 / ※Hood material: SUS304 	<b>FDC-320-06B</b>	M3-D0.6 
<b>FDN-210-05R</b>	M2-D0.5 / ※Hood material: SUS304 	<b>FD-420-06B</b>	M4-D0.6 
<b>FD-210-05R</b>	M2-D0.5 / ※Hood material: SUS304 	<b>FD-620-13B</b>	M6-D1.3 
<b>FD-320-05(R)</b>	M3-D0.5 	<b>FDC-320-05</b>	M3-D0.5 
<b>FD-420-05(R)</b>	M4-D0.5 	<b>FDCS-320-05</b>	Ø3-D0.5 / SUS Ø1.5×15mm 
<b>FD-620-10(R)</b>	M6-D1.0 	<b>FDS-320-05</b>	M3-D0.5 / SUS Ø1.5×90mm 
<b>FD-320-06B</b>	M3-D0.6 	<b>FDS2-320-05</b>	M3-D0.5 / SUS Ø1.5×45mm 

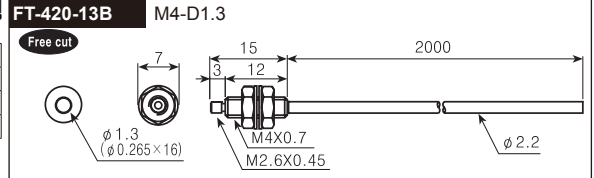
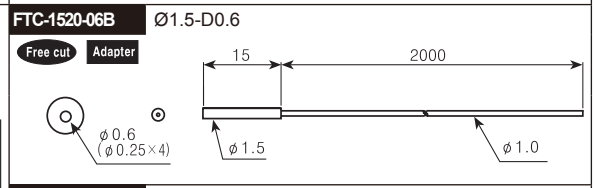
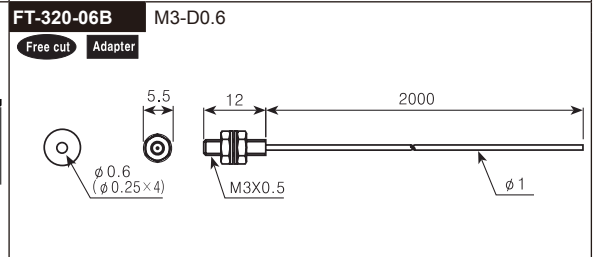
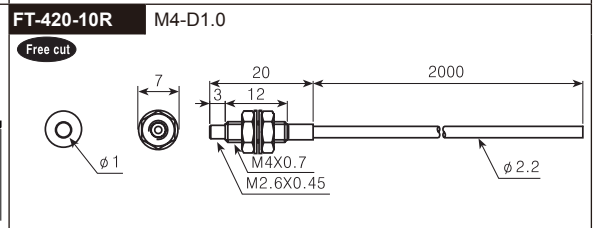
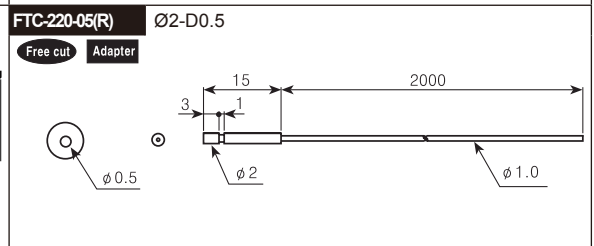
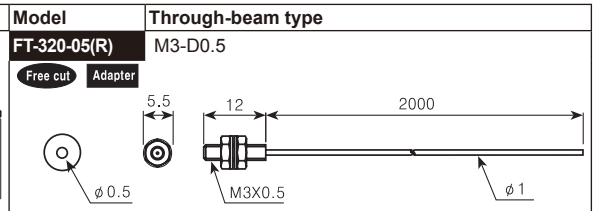
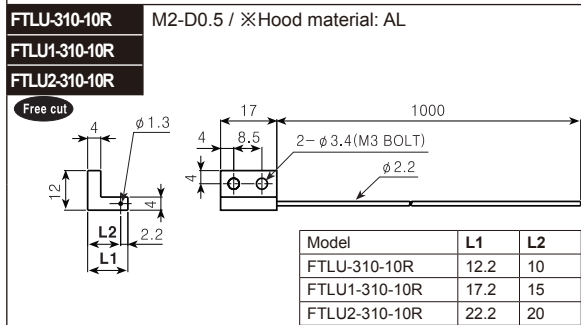
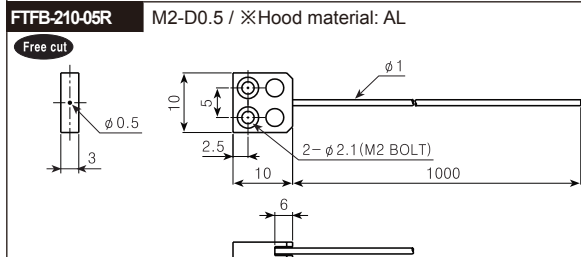
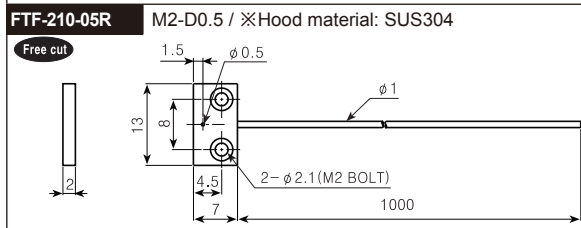
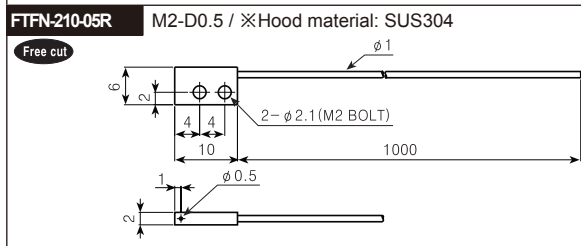
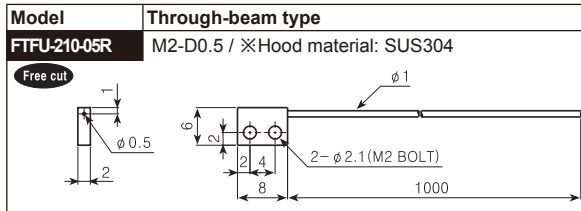
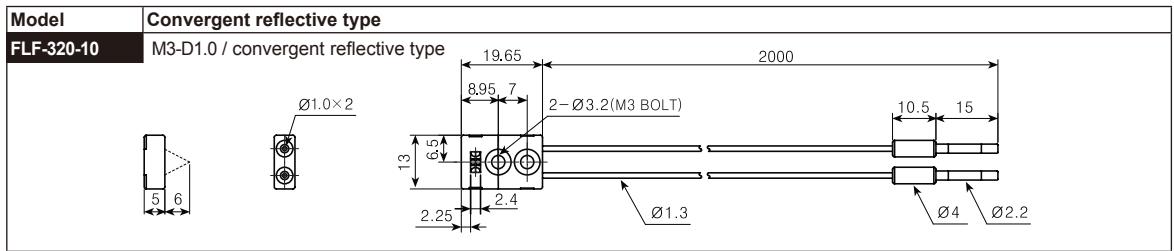
- (A) Photo electric sensor
- (B) Fiber optic sensor
- (C) Door/Area sensor
- (D) Proximity sensor
- (E) Pressure sensor
- (F) Rotary encoder
- (G) Connector/Socket
- (H) Temp. controller
- (I) SSR/ Power controller
- (J) Counter
- (K) Timer
- (L) Panel meter
- (M) Tacho/ Speed/ Pulse meter
- (N) Display unit
- (O) Sensor controller
- (P) Switching mode power supply
- (Q) Stepper motor& Driver&Controller
- (R) Graphic/ Logic panel
- (S) Field network device
- (T) Software
- (U) Other

# Fiber Optic Cable

## Dimensions

Model	Diffuse reflective type	Model	Diffuse reflective type
<b>FDS-420-05</b> Free cut Adapter	M4-D0.5 / SUS Ø1.5×90mm 	<b>FD-320-F1</b> Free cut Adapter	Co-axial M3 / Ø0.5, Ø0.25×9 
<b>FDS2-420-05</b> Free cut Adapter	M4-D0.5 / SUS Ø1.5×45mm 	<b>FD-620-F2</b> Free cut	Co-axial M6 / Ø1.0, Ø0.265×16 
<b>FDS-620-10</b> Free cut	M6-D1.0 / SUS Ø2.5×90mm 	<b>FD-620-10H</b> Free cut	M6-D1.0 / Heat-resistant 105°C 
<b>FDS2-620-10</b> Free cut	M6-D1.0 / SUS Ø2.5×45mm 	<b>FD-620-15H1</b> Free cut	M6-D1.5 / Heat-resistant 150°C 
<b>FDP-320-10</b> Free cut	D1.0×2 / Plastic 	<b>GD-420-20H2</b>	M4-D0.05×1000 / Heat-resistant 250°C 
<b>FD-320-F</b> Free cut Adapter	Co-axial M3 / Ø0.5, Ø0.25×4 	<b>GD-620-20H2</b>	M6-D0.05×1000 / Heat-resistant 250°C 
<b>FDCSN-320-05</b>	Ø3 / SUS Ø1.47×20 / Side view 		

## Dimensions



- (A) Photo electric sensor
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- (U) Other

# Fiber Optic Cable

## Dimensions

Model	Through-beam type	Model	Through-beam type
<b>FTC-1520-05</b> Free cut Adapter	Ø1.5-D0.5 	<b>FTP-320-10</b> Free cut	D1.0 / Plastic 
<b>FTCS-220-05</b> Free cut Adapter	Ø2-D0.5 / SUS Ø1.0×15mm 	<b>FTS-420-10</b> Free cut	M4-D1.0 / SUS Ø1.5×90mm 
<b>FTS-320-05</b> Free cut Adapter	M3-D0.5 / SUS Ø1.0×90mm 	<b>FTS2-420-10</b> Free cut	M4-D1.0 / SUS Ø1.5×45mm 
<b>FTS1-320-05</b> Free cut Adapter	M3-D0.5 / SUS Ø1.0×35mm 	<b>FT-420-10H</b> Free cut	M4-D1.0 / Heat-resistant 105°C 
<b>FTS2-320-05</b> Free cut Adapter	M3-D0.5 / SUS Ø1.0×45mm 	<b>FT-420-15H1</b> Free cut	M4-D1.0 / Heat-resistant 150°C 
<b>FT-420-10</b> Free cut	M4-D1.0 	<b>GT-420-13H2</b> Free cut	M4-D1.3 / Heat-resistant Max. 250°C / Glass 
<b>FTC-320-10</b> Free cut	Ø3-D1.0 	<b>FTCSN-2520-05</b> Free cut	Ø2.47-D0.5 / SUS Ø0.8×15mm / Side view 



## ■ Lens unit for long distance detection(sold separately)

### ◎ Model : FTL-M26



### ◎ Mounting of lens

Mount the lens unit on the 3mm projecting point of the front hood.

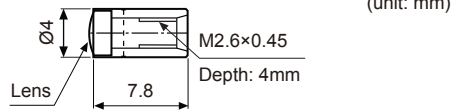
### ◎ Ambient temperature range of lens unit

It should be used within -40 to 100°C.(not over 100°C.)

### ◎ Applicable fiber optic cable and max. mounting distance

- FT-420-10 : 2500mm
- FT-420-10H : 1500mm

### ◎ Dimensions

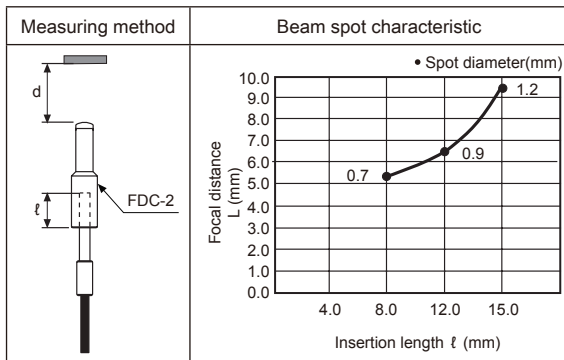


## ■ Micro spot fiber optic cable and lens unit(sold separately)

### ◎ Model

- Fiber optic cable: **FDC-320-F**
- Micro spot lens: **FDC-2**

### ◎ Feature data

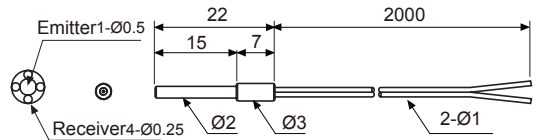


### ◎ Ambient temperature range of lens unit

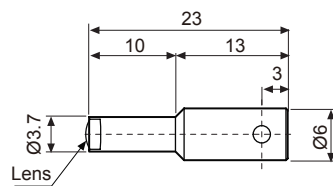
It should be used within -40 to 100°C. (not over 100°C.)

### ◎ Dimensions

#### • FDC-320-F



#### • FDC-2



## ■ Protection tube for fiber optic cable (sold separately)

### ◎ Application

: Protect cable from impact or cutting (unit:mm)

Model	Appearance and Dimension
FTH-310	
FTH-410	
FDH-610	

※500mm of protection tube can be customized.

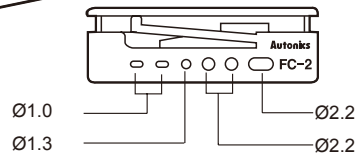
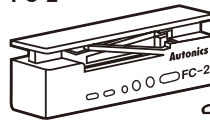
※Additional 8mm is for tube coupling.

## ■ Accessory

### ◎ Fiber cutter

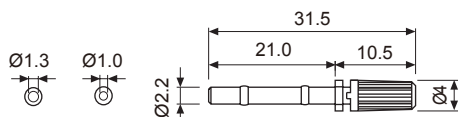
Applications: Cutting fiber optic cable, free cut type

#### • FC-2



### ◎ Adapter

Adapter: Adapter marked fiber optic cable should be used with adapter (unit: mm)



※The inside diameter  $\phi 1.0$ (Standard and black)

※The inside diameter  $\phi 1.3$ (Only applied to the receiver of FD-320-F1 and dark gray.)

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