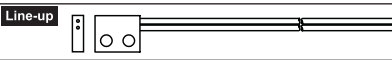
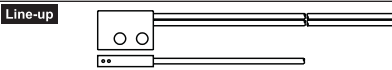
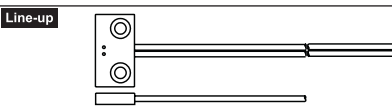
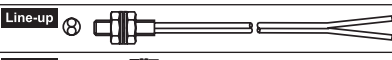
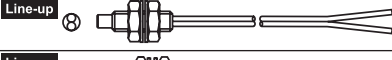
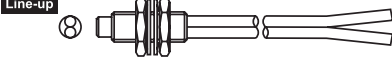
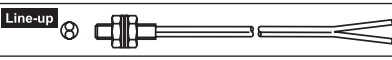



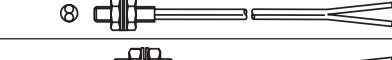

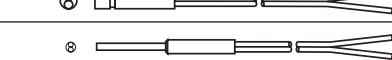






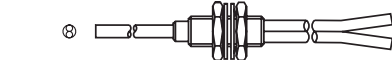




# Fiber Optic Cable

## 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	35 <sup>※1</sup>					
		Flat type /Flat view	FDF-210-05R	30 <sup>※1</sup>					
		M3 Bolt	FD-320-05R	35 <sup>※1</sup>					
		M4 Bolt	FD-420-05R	35 <sup>※1</sup>					
		M6 Bolt	FD-620-10R	130 <sup>※1</sup>	Ø0.04				
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						Ø3 Cylinder type
		M4 Bolt	FD-420-06B	M4 Bolt					
		M6 Bolt	FD-620-13B	M6 Bolt					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						M4 Bolt
		Ø3 Cylinder type	FDC-320-05						Ø3 Cylinder type
		Ø3 Cylinder type SUS type(90mm)	FDCS-320-05	Ø3 Cylinder type SUS type(90mm)					
		M3 Bolt SUS type(90mm)	FDS-320-05	M3 Bolt SUS type(90mm)					
		M3 Bolt SUS type(45mm)	FDS2-320-05	M3 Bolt SUS type(45mm)					
		M4 Bolt SUS type(90mm)	FDS-420-05	M4 Bolt SUS type(90mm)					
		M4 Bolt SUS type(45mm)	FDS2-420-05	M4 Bolt SUS type(45mm)					
		M6 Bolt	FD-620-10	M6 Bolt		120 <sup>※2</sup>			R30
	M6 Bolt SUS type(90mm)	FDS-620-10	M6 Bolt SUS type(90mm)	30R (SUS part 10R)					
	M6 Bolt SUS type(45mm)	FDS2-620-10	M6 Bolt SUS type(45mm)	30R (SUS part 10R)					
	Plastic	FDP-320-10	Plastic		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-3) 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>					
Heat-resistant type		M6 Bolt	<b>FD-620-10H</b>	120 <sup>※2</sup>		R30	R30	2m <b>Free cut</b>	-40 to 105°C
		M6 Bolt	<b>FD-620-15H1</b>	160 <sup>※2</sup>					
		M4 Bolt Glass type	<b>GD-420-20H2</b>	100 <sup>※2</sup>		R50	2m	-40 to 250°C	
		M4 Bolt Glass type	<b>GD-620-20H2</b>						
Right angle		M6 Bolt	<b>FDR-610-10R</b>	120 <sup>※1</sup>	Ø0.04	R1	1m <b>Free cut</b>		
Side view			<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-3) 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>	Ø0.04	R1	1m	-40 to 60°C
	<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>				
	<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> <b>FTLU1-310-10R</b> <b>FTLU2-310-10R</b>	500 <sup>※1</sup>				
	<b>Line-up</b> 	M3 Bolt	<b>FT-320-05R</b>	110 <sup>※1</sup>				
	<b>Line-up</b> 	Ø2 Cylinder type	<b>FTC-220-05R</b>					
	<b>Line-up</b> 	M4 Bolt	<b>FT-420-10R</b>	500 <sup>※1</sup>				
<b>Break-resistant type<sup>※5</sup></b>	<b>Line-up</b> 	M3 Bolt	<b>FT-320-06B</b>	110 <sup>※2</sup>	Ø0.3			
	<b>Line-up</b> 	Ø1.5 Cylinder type	<b>FTC-1520-06B</b>					
	<b>Line-up</b> 	M4 Bolt	<b>FT-420-13B</b>	400 <sup>※2</sup>	Ø0.6			

※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 type 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-3) 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	FT-320-05	150 <sup>※2</sup>	Ø0.5	R15	2m	-40 to 70°C				
	<b>Line-up</b> 	Ø1.5 Cylinder type	FTC-1520-05									
		Ø2 Cylinder type	FTC-220-05									
		Ø2 Cylinder type SUS type(90mm)	FTCS-220-05									
		M3 Bolt SUS type(90mm)	FTS-320-05									
		M3 Bolt SUS type(35mm)	FTS1-320-05									
		M3 Bolt SUS type(45mm)	FTS2-320-05									
		M4 Bolt	FT-420-10						500 <sup>※2</sup>	Ø1	R30	Free cut
		Ø3 Cylinder type	FTC-320-10									
		Plastic	FTP-320-10									
	M4 Bolt SUS type(90mm)	FTS-420-10										
	M4 Bolt SUS type(45mm)	FTS2-420-10										
Heat-resistant type		M4 Bolt	FT-420-10H	300 <sup>※2</sup>	R30	-40 to 105°C						
		M4 Bolt	FT-420-15H1	500 <sup>※2</sup>	R50	-40 to 150°C						
		M4 Bolt Glass type	GT-420-13H2	400 <sup>※2</sup>	R25	2m -40 to 250°C						
Right angle	<b>Line-up</b> 	M4 Bolt	FTR-410-10R	460 <sup>※1</sup>	Ø0.5	R1	1m Free cut	-40 to 60°C				
Side view	<b>Line-up</b> 	Ø2.47 Cylinder type	FTCSN-2520-05	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.

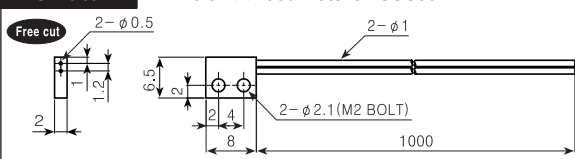
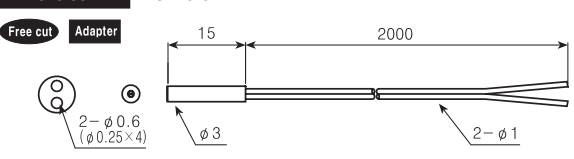
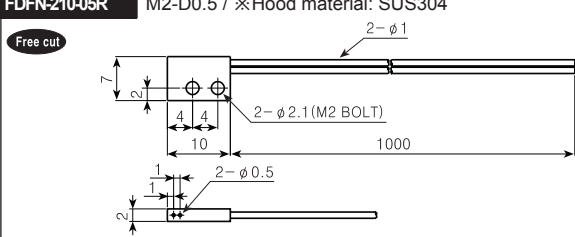
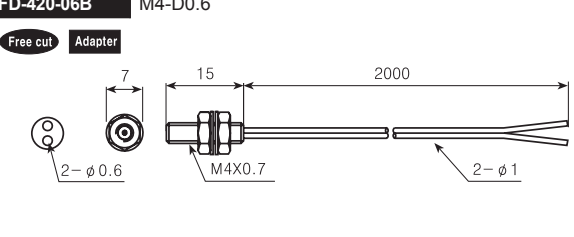
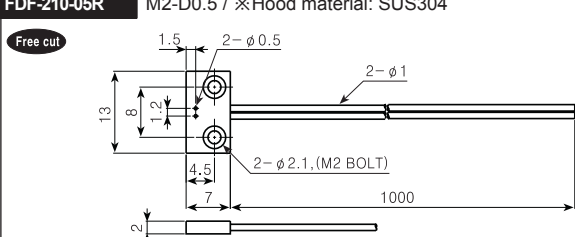
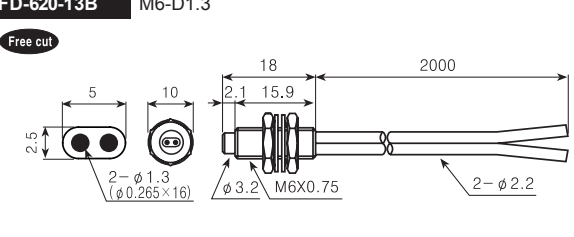
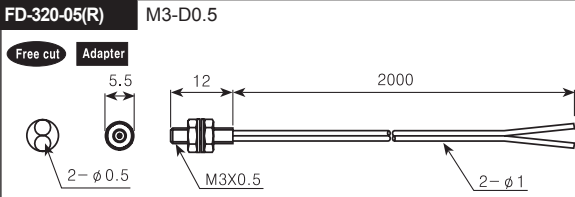
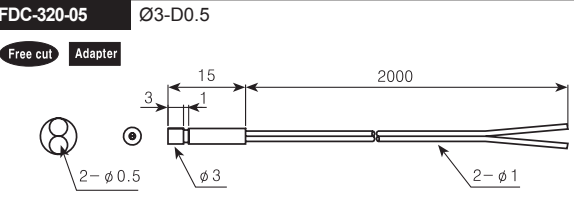
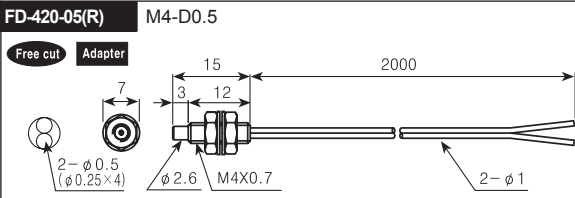
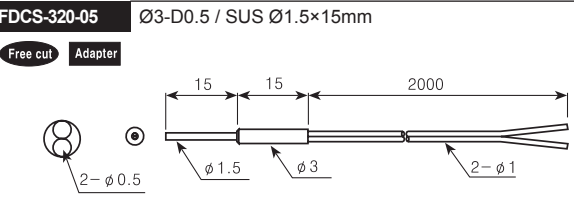
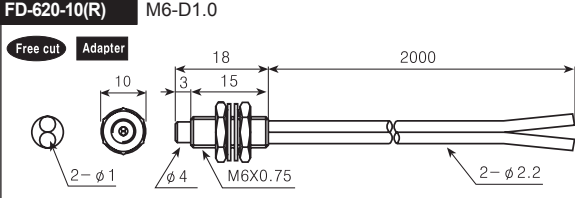
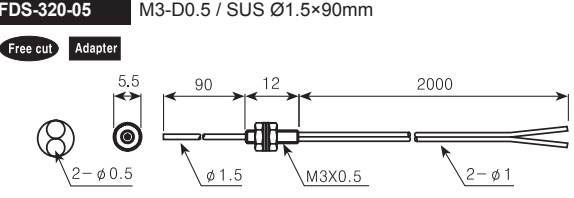
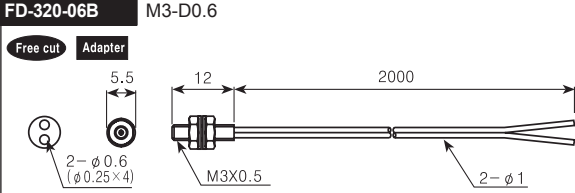
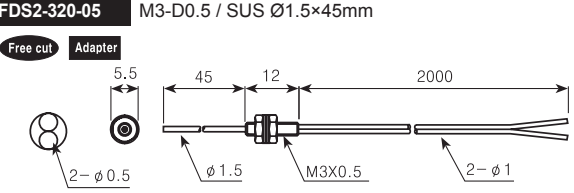
※3: Min. sensing target is a value measured opaque material in accurate output status and the sensing distance is different with the rated sensing distance ※2.

※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-3) should be used for cutting fiber cable.]

※Glass type is for BF5R, BF4R Series.

## ■ 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>	Ø3-D0.5 
<b>FD-420-05(R)</b>	M4-D0.5 	<b>FD-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 

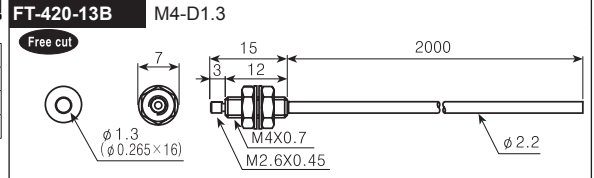
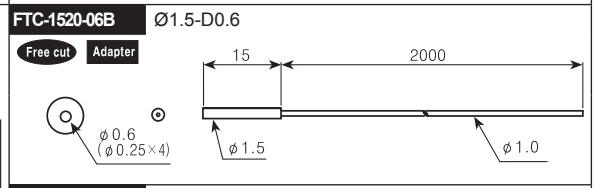
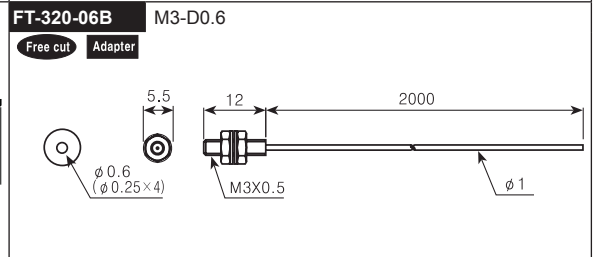
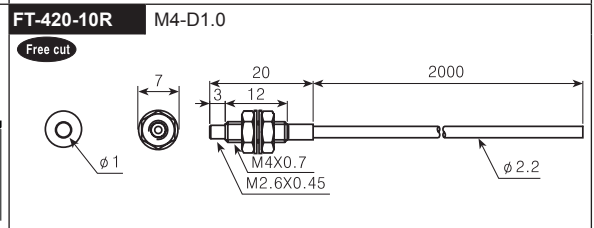
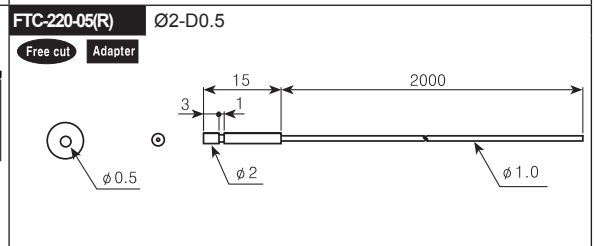
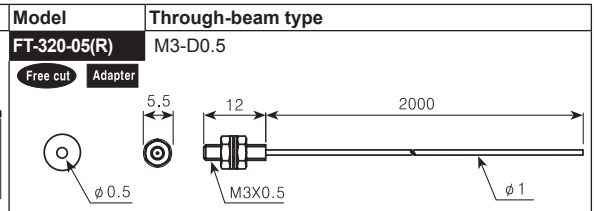
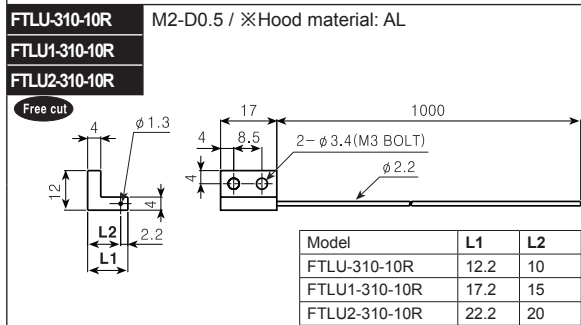
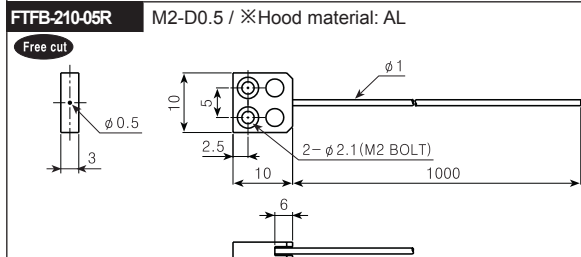
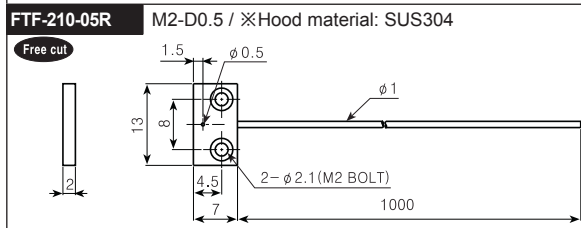
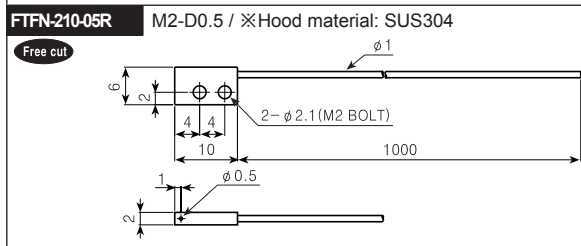
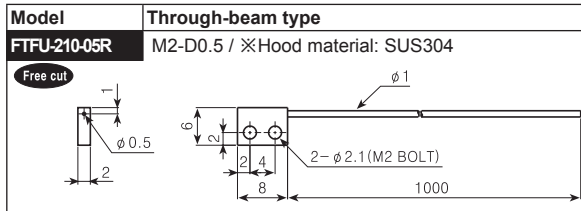
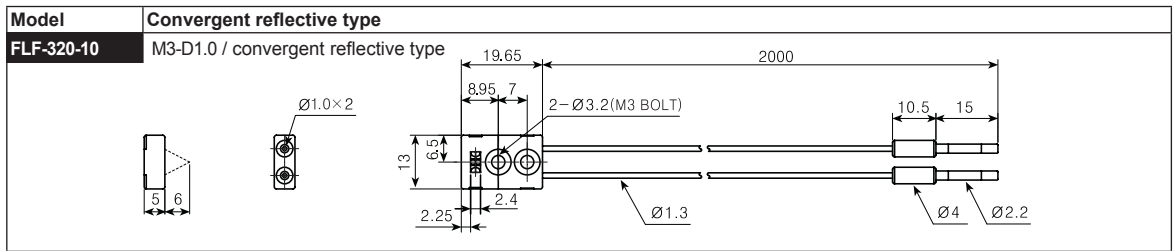
- (A) Photo electric sensor
- (B) Fiber optic sensor
- (C) Door/Area sensor
- (D) Proximity sensor
- (E) Pressure sensor
- (F) Rotary encoder
- (G) Connector/ Socket
- (H) Temp. controller
- (I) SSR/ Power controller
- (J) Counter
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- (P) Switching mode 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>FDR-610-10R</b> Free cut	M6-D1.0 / ※Hood material: SUS303	<b>FDCSN-320-05</b>	Ø3 / SUS Ø1.47×20 / Side view

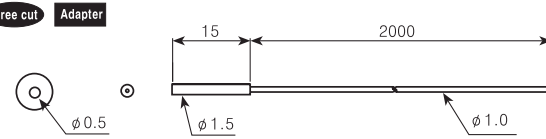
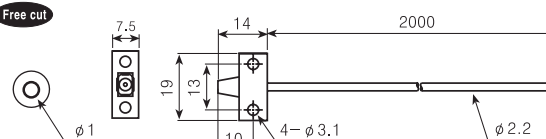
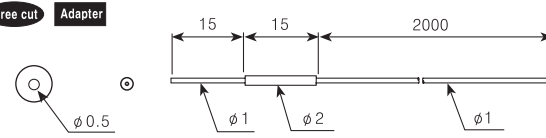
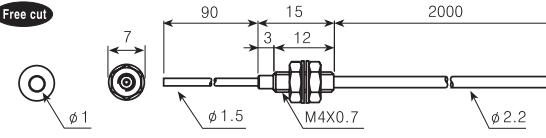
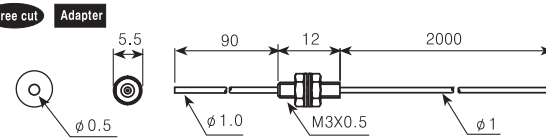
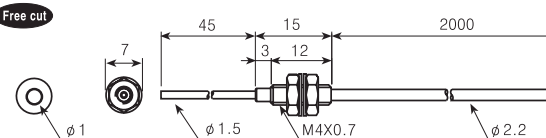
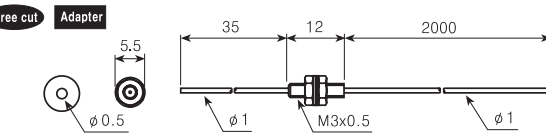
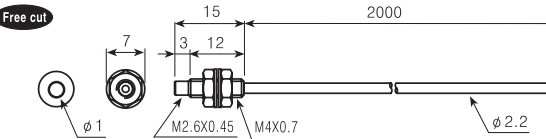
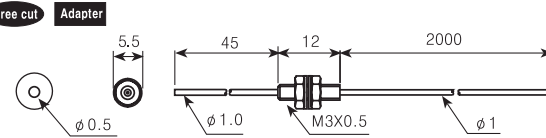
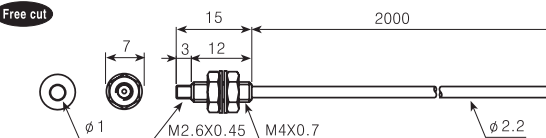
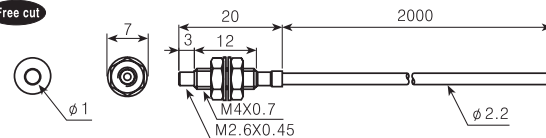
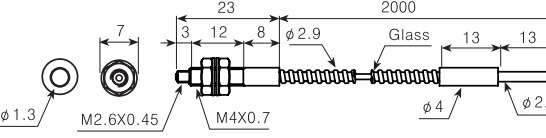
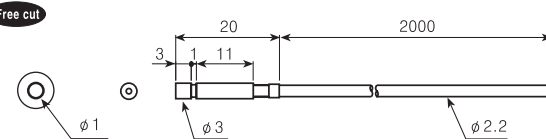
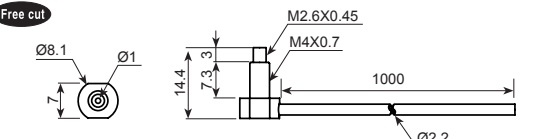
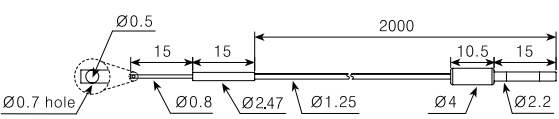
## ■ Dimensions



- (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	Through-beam type	Model	Through-beam type
<b>FTC-1520-05</b>	Ø1.5-D0.5	<b>FTP-320-10</b>	D1.0 / Plastic
Free cut Adapter 		Free cut 	
<b>FTCS-220-05</b>	Ø2-D0.5 / SUS Ø1.0×15mm	<b>FTS-420-10</b>	M4-D1.0 / SUS Ø1.5×90mm
Free cut Adapter 		Free cut 	
<b>FTS-320-05</b>	M3-D0.5 / SUS Ø1.0×90mm	<b>FTS2-420-10</b>	M4-D1.0 / SUS Ø1.5×45mm
Free cut Adapter 		Free cut 	
<b>FTS1-320-05</b>	M3-D0.5 / SUS Ø1.0×35mm	<b>FT-420-10H</b>	M4-D1.0 / Heat-resistant 105°C
Free cut Adapter 		Free cut 	
<b>FTS2-320-05</b>	M3-D0.5 / SUS Ø1.0×45mm	<b>FT-420-15H1</b>	M4-D1.0 / Heat-resistant 150°C
Free cut Adapter 		Free cut 	
<b>FT-420-10</b>	M4-D1.0	<b>GT-420-13H2</b>	M4-D1.3 / Heat-resistant Max. 250°C / Glass
Free cut 		Free cut 	
<b>FTC-320-10</b>	Ø3-D1.0	<b>FTR-410-10R</b>	M4-D1.0 ※Hood material: SUS303
Free cut 		Free cut 	
<b>FTCSN-2520-05</b>	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.

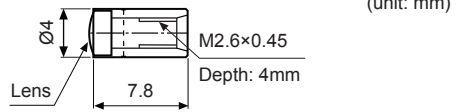
### ◎ Ambient temperature range of lens unit

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

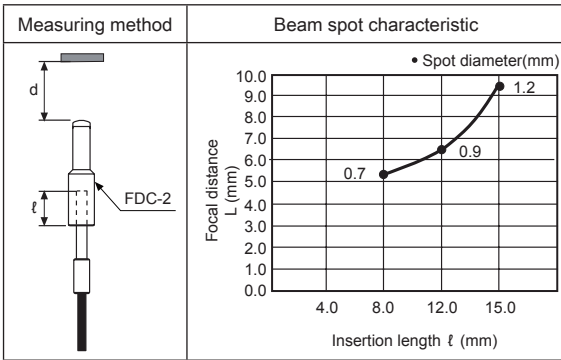


## ■ Micro spot fiber optic cable and lens unit(sold separately)

### ◎ Model

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

### ◎ Feature data

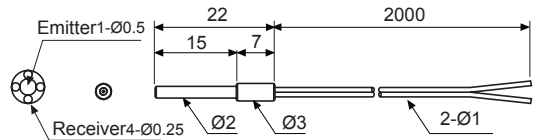


### ◎ Ambient temperature range of lens unit

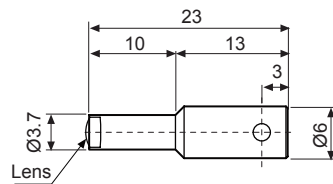
It should be used within -40 to 100°C. (not over 100°C.)

### ◎ 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	L
FTH-305		500
FTH-310		1000
FTH-405		500
FTH-410		1000
FDH-605		500
FDH-610		1000

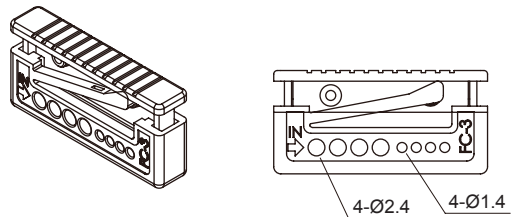
※Additional 8mm is for tube coupling.

## ■ Accessory

### ◎ Fiber cutter

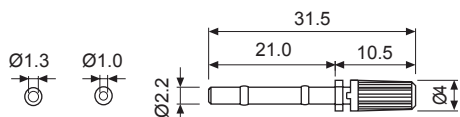
Applications: Cutting fiber optic cable, free cut type

#### • FC-3



### ◎ Adapter

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



※The inside diameter Ø1.0(Standard and black)

※The inside diameter Ø1.3(Only applied to the receiver of FD-320-F1 and dark gray.)

(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

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(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