





















## ■ Diffuse Reflective Type

(based on Non-glossy white paper)

Type	Appearance	Feature	Sensing distance (mm)	Min. Sensing Target <sup>※3</sup>	Allowable Bend Radius	Cable length (L)	Ambient Temperature	Model	
Bolt type	Standard type	 M3	40 <sup>※2</sup>	∅0.03	R15	1m (Free cut)	-40 to 70°C	FD-310-05	
		 M3	40 <sup>※2</sup>	∅0.03	R15	2m (Free cut)	-40 to 70°C	FD-320-05	
		 M4	40 <sup>※2</sup>	∅0.03	R15	2m (Free cut)	-40 to 70°C	FD-420-05	
		 M3 (SUS type, 90mm)	40 <sup>※2</sup>	∅0.03	R15 (SUS part R10)	2m (Free cut)	-40 to 70°C	FDS-320-05	
		 M3 (SUS type, 45mm)						FDS2-320-05	
		 M4 (SUS type, 90mm)	40 <sup>※2</sup>	∅0.03	R15 (SUS part R10)	2m (Free cut)	-40 to 70°C	FDS-420-05	
		 M4 (SUS type, 45mm)						FDS2-420-05	
	 M6	M6	120 <sup>※2</sup>	∅0.03	R30	2m (Free cut)	-40 to 70°C	FD-620-10	
		 M6 (SUS type, 90mm)	120 <sup>※2</sup>	∅0.03	R30 (SUS part R10)	2m (Free cut)	-40 to 70°C	FDS-620-10	
	 M6 (SUS type, 45mm)	FDS2-620-10							
	Heat-resistant type	 M6	M6	120 <sup>※2</sup>	∅0.03	R30	2m (Free cut)	-40 to 105°C	FD-620-10H
		 M6	M6	160 <sup>※2</sup>	∅0.03	R50	2m (Free cut)	-40 to 150°C	FD-620-15H1
		 M4 (Glass type)	100 <sup>※2</sup>	∅0.03	R50	2m	-40 to 250°C	GD-420-20H2	
		 M6 (Glass type)						GD-620-20H2	
	Flexible type <sup>※4</sup>	 M3	M3	35 <sup>※1</sup>	∅0.0125	R1	2m (Free cut)	-40 to 60°C	FD-320-05R
 M4		M4	FD-420-05R						
 M6		M6	130 <sup>※1</sup>						∅0.04
Break-resistant type <sup>※4</sup>	 M3	M3	35 <sup>※2</sup>	∅0.0125	R5	2m (Free cut)	-40 to 60°C	FD-320-06B	
	 M4	M4						FD-420-06B	
	 M6	M6						100 <sup>※2</sup>	∅0.0125

※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: **Flexible optical fiber (Multi core):** A large number of ultra-fine cores are all surrounded by cladding. Easy to install it in the many places as 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, by ensuring a high degree of flexibility. It can be used for moving parts (robot hand) and it is not easily broken.

※Free cut type's 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.]







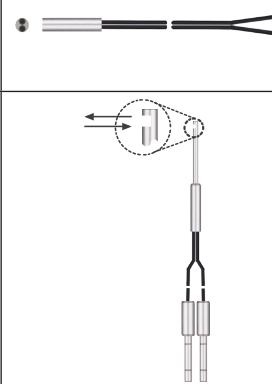




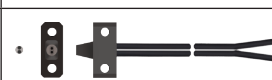
※Glass type is for BF5, BF4 Series.

(A) Photoelectric Sensors
(B) Fiber Optic Sensors
(C) Door/Area Sensors
(D) Proximity Sensors
(E) Pressure Sensors
(F) Rotary Encoders
(G) Connectors/ Connector Cables/ Sensor Distribution Boxes/ Sockets
(H) Temperature Controllers
(I) SSRs / Power Controllers
(J) Counters
(K) Timers
(L) Panel Meters
(M) Tacho / Speed / Pulse Meters
(N) Display Units
(O) Sensor Controllers
(P) Switching Mode Power Supplies
(Q) Stepper Motors & Drivers & Controllers
(R) Graphic/ Logic Panels
(S) Field Network Devices
(T) Software

# Fiber Optic Cable


## ■ Diffuse Reflective Type

(based on Non-glossy white paper)

Type	Appearance	Feature	Sensing distance (mm)	Min. Sensing Target <sup>※3</sup>	Allowable Bend Radius	Cable length (L)	Ambient Temperature	Model	
Bolt type	Coaxial type		M3	40 <sup>※2</sup>	Ø0.03	R15	2m (Free cut)	-40 to 70°C	<b>FD-320-F</b>
			M3	60 <sup>※2</sup>	Ø0.03	R30	2m (Free cut)	-40 to 70°C	<b>FD-320-F1</b>
			M6	120 <sup>※2</sup>	Ø0.03	R30	2m (Free cut)	-40 to 70°C	<b>FD-620-F2</b>
Cylinder type	Standard type		Ø3mm	40 <sup>※2</sup>	Ø0.03	R15	2m (Free cut)	-40 to 70°C	<b>FDC-320-05</b>
			Ø3mm (SUS type, 15mm)	40 <sup>※2</sup>	Ø0.03	R15 (SUS part R10)	2m (Free cut)	-40 to 70°C	<b>FDCS-320-05</b>
	Break-resistant type <sup>※4</sup>		Ø3mm	35 <sup>※2</sup>	Ø0.0125	R5	2m (Free cut)	-40 to 60°C	<b>FDC-320-06B</b>
	Standard type		Ø3mm Side view	30 <sup>※1</sup>	Ø0.0125	R15	2m	-40 to 60°C	<b>FDCSN-320-05</b>
Flat type	Flexible type		Top view	35 <sup>※1</sup>	Ø0.0125	R1	1m (Free cut)	-40 to 60°C	<b>FDFU-210-05R</b>
			Side view	30 <sup>※1</sup>	Ø0.0125	R1	1m (Free cut)	-40 to 60°C	<b>FDFN-210-05R</b>
			Flat view	30 <sup>※1</sup>	Ø0.0125	R1	1m (Free cut)	-40 to 60°C	<b>FDF-210-05R</b>
Right angle	Flexible type		M6	120 <sup>※1</sup>	Ø0.04	R1	1m (Free cut)	-40 to 60°C	<b>FDR-610-10R</b>
Plastic	Standard type		Plastic injection molding type	120 <sup>※2</sup>	Ø0.03	R30	2m (Free cut)	-40 to 70°C	<b>FDP-320-10</b>

## ■ Convergent Reflective Type

(based on Non-glossy white paper)

Type	Appearance	Feature	Sensing distance (mm)	Min. Sensing Target <sup>※3</sup>	Allowable Bend Radius	Cable length (L)	Ambient Temperature	Model	
Flat type	Standard type		Convergent reflective type	8 <sup>※1</sup>	Ø0.0125	R25	2m	-40 to 60°C	<b>FLF-320-10</b>

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

※Free cut type's 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.]

## ■ Through-Beam Type

(based on Non-glossy white paper)

Type	Appearance	Feature	Sensing distance (mm)	Min. Sensing Target <sup>※3</sup>	Allowable Bend Radius	Cable length (L)	Ambient Temperature	Model
Bolt type	Standard type	M3	150 <sup>※2</sup>	∅0.5	R15	1m (Free cut)	-40 to 70°C	FT-310-05
		M3	150 <sup>※2</sup>	∅0.5	R15	2m (Free cut)	-40 to 70°C	FT-320-05
		M3 (SUS type, 90mm)	150 <sup>※2</sup>	∅0.5	R15 (SUS part R10)	2m (Free cut)	-40 to 70°C	FTS-320-05
		M3 (SUS type, 45mm)						FTS1-320-05
		M3 (SUS type, 45mm)						FTS2-320-05
		M4	500 <sup>※2</sup>	∅1	R30	2m (Free cut)	-40 to 70°C	FT-420-10
	M4 (SUS type, 90mm)	500 <sup>※2</sup>	∅1	R30 (SUS part 10)	2m (Free cut)	-40 to 70°C	FTS-420-10	
	M4 (SUS type, 45mm)	500 <sup>※2</sup>	∅1	R30 (SUS part 10R)	2m (Free cut)	-40 to 70°C	FTS2-420-10	
	Heat-resistant type	M4	300 <sup>※2</sup>	∅1	R30	2m (Free cut)	-40 to 105°C	FT-420-10H
		M4	500 <sup>※2</sup>	∅1	R50	2m (Free cut)	-40 to 150°C	FT-420-15H1
		M4 (Glass type)	400 <sup>※2</sup>	∅1	R25	2m	-40 to 250°C	GT-420-13H2
	Flexible type <sup>※4</sup>	M3	110 <sup>※1</sup>	∅0.3	R1	2m (Free cut)	-40 to 60°C	FT-320-05R
		M4	500 <sup>※1</sup>	∅0.5	R1	2m (Free cut)	-40 to 60°C	FT-420-10R
	Break-resistant type <sup>※4</sup>	M3	110 <sup>※1</sup>	∅0.3	R5	2m (Free cut)	-40 to 60°C	FT-320-06B
M4		400 <sup>※1</sup>	∅0.6	R5	2m (Free cut)	-40 to 60°C	FT-420-13B	
Cylinder type	Standard type	∅1.5mm	150 <sup>※2</sup>	∅0.5	R15	2m (Free cut)	-40 to 70°C	FTC-1520-05
		∅2mm	150 <sup>※2</sup>	∅0.5	R15	2m (Free cut)	-40 to 70°C	FTC-220-05
		∅2mm (SUS type, 15mm)	150 <sup>※2</sup>	∅0.5	R15 (SUS part10R)	2m (Free cut)	-40 to 70°C	FTCS-220-05
		∅3mm	150 <sup>※2</sup>	∅1	R30	2m (Free cut)	-40 to 70°C	FTC-320-10

※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: • **Flexible optical fiber (Multi core):** A large number of ultra-fine cores are all surrounded by cladding. Easy to install it in the many places as 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, by ensuring a high degree of flexibility. It can be used for moving parts (robot hand) and it is not easily broken.

※Free cut type's 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.

※Glass type is for BF5R, BF4R Series.

(A) Photoelectric Sensors

(B) Fiber Optic Sensors

(C) Door/Area Sensors

(D) Proximity Sensors

(E) Pressure Sensors

(F) Rotary Encoders

(G) Connectors/ Connector Cables/ Sensor Distribution Boxes/ Sockets

(H) Temperature Controllers

(I) SSRs / Power Controllers

(J) Counters

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(O) Sensor Controllers

(P) Switching Mode Power Supplies

(Q) Stepper Motors & Drivers & Controllers

(R) Graphic/ Logic Panels



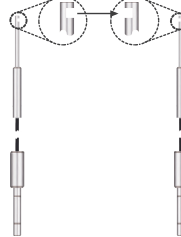






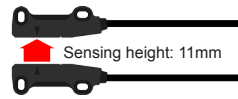

(S) Field Network Devices

(T) Software

# Fiber Optic Cable

## ■ Through-Beam Type

(based on Non-glossy white paper)

Type	Appearance	Feature	Sensing distance (mm)	Min. Sensing Target <sup>※3</sup>	Allowable Bend Radius	Cable length (L)	Ambient Temperature	Model	
Cylinder type	Flexible type <sup>※4</sup>		Ø3mm	110 <sup>※1</sup>	Ø0.3	R1	2m (Free cut)	-40 to 60°C	FTC-220-05R
	Break-resistant type <sup>※4</sup>		Ø3mm	110 <sup>※2</sup>	Ø0.3	R5	2m (Free cut)	-40 to 60°C	FTC-1520-06B
	Standard type		Ø2.47mm Side view	120 <sup>※1</sup>	Ø0.0125	R15	2m	-40 to 60°C	FTCSN-2520-05
Flat type	Flexible type		Top view	110 <sup>※1</sup>	Ø0.04	R1	1m (Free cut)	-40 to 60°C	FTFU-210-05R
			Side view	110 <sup>※1</sup>	Ø0.04	R1	1m (Free cut)	-40 to 60°C	FTFN-210-05R
			Flat view	100 <sup>※1</sup>	Ø0.04	R1	1m (Free cut)	-40 to 60°C	FTF-210-05R
			Side view+ Top view (Bending)	110 <sup>※1</sup>	Ø0.04	R1	1m (Free cut)	-40 to 60°C	FTFB-210-05R
			L type Top view height 12.2mm	500 <sup>※1</sup>	Ø0.06	R1	1m (Free cut)	-40 to 60°C	FTLU-310-10R
			L type Top view height 17.2mm						FTLU1-310-10R
L type Top view height 22.2mm	FTLU2-310-10R								
Right angle	Flexible type		M4	460 <sup>※1</sup>	Ø0.5	R1	1m (Free cut)	-40 to 60°C	FTR-410-10R
Area type	Flexible type		Ø1mm	750 <sup>※5</sup>	Ø0.07	R2	1m (Free cut)	-40 to 60°C	FTW11-210-10R
Plastic	Standard type		Plastic injection molding type	500 <sup>※2</sup>	Ø1	R30	2m (Free cut)	-40 to 70°C	FTP-320-10

※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: • **Flexible optical fiber (Multi core):** A large number of ultra-fine cores are all surrounded by cladding. Easy to install it in the many places as 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, by ensuring a high degree of flexibility. It can be used for moving parts (robot hand) and it is not easily broken.

※5: The sensing distance is a standard for BF5 Series, and it is varied by operation mode.

(Ultra fast mode: 450mm / Fast mode: 750mm / Standard mode: 1400mm / Long distance mode, Ultra long distance mode: 1800mm)

※Free cut type's 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.]

## Dimensions

Model	Diffuse reflective type	Model	Diffuse reflective type
<b>FDUF-210-05R</b>	M2-D0.5 / ※Hood material: Stainless steel type 303 	<b>FDC-320-06B</b>	M3-D0.6 
<b>FDNF-210-05R</b>	M2-D0.5 / ※Hood material: Stainless steel type 303 	<b>FD-420-06B</b>	M4-D0.6 
<b>FD-210-05R</b>	M2-D0.5 / ※Hood material: Stainless steel type 303 	<b>FD-620-13B</b>	M6-D1.3 
<b>FD-310-05</b>	M3-D0.5 	<b>FDC-320-05</b>	Ø3-D0.5 
<b>FD-320-05(R)</b>	M3-D0.5 	<b>FDCS-320-05</b>	Ø3-D0.5 / Stainless steel Ø1.5x15mm 
<b>FD-420-05(R)</b>	M4-D0.5 	<b>FDS-320-05</b>	M3-D0.5 / Stainless steel Ø1.5x90mm 
<b>FD-620-10(R)</b>	M6-D1.0 		

(A) Photoelectric Sensors

(B) Fiber Optic Sensors

(C) Door/Area Sensors

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(R) Graphic/ Logic Panels

(S) Field Network Devices

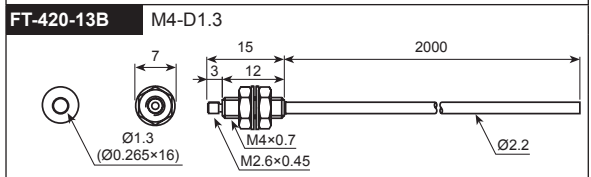
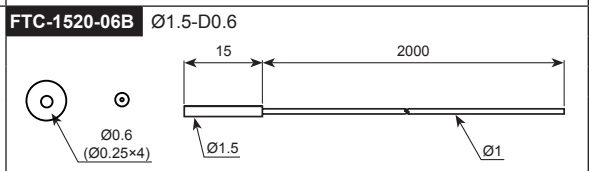
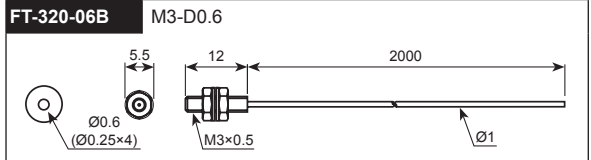
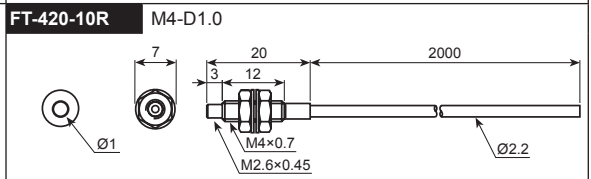
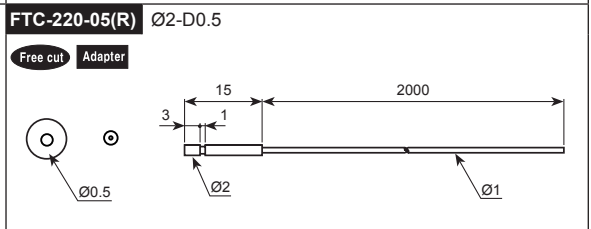
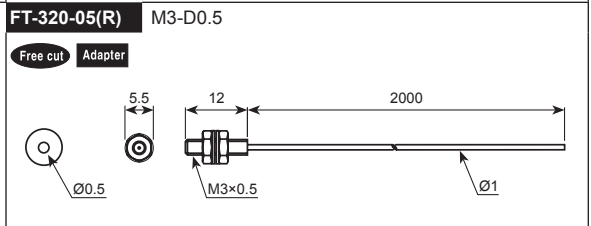
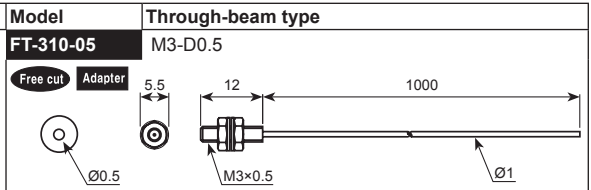
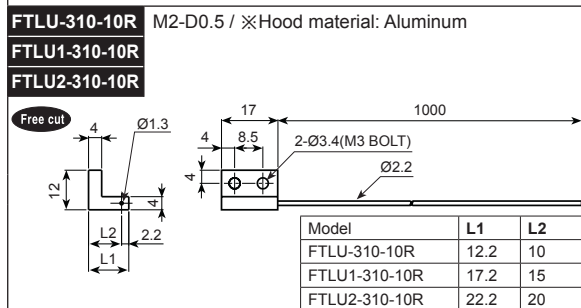
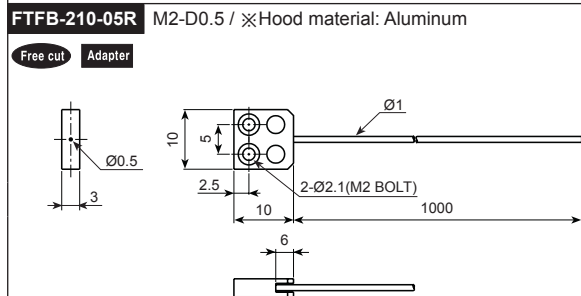
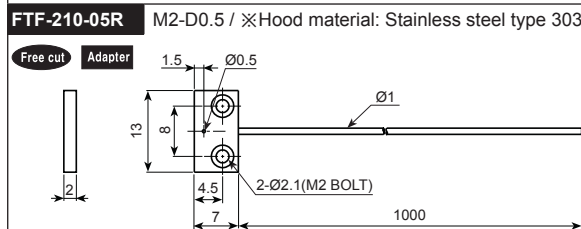
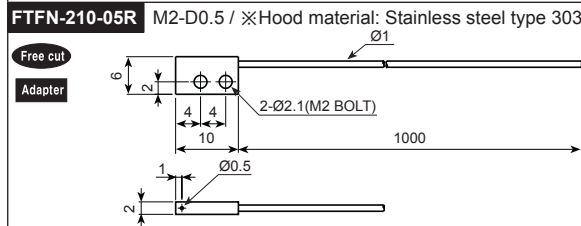
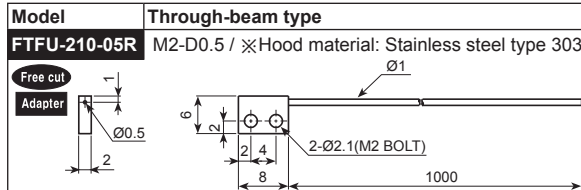
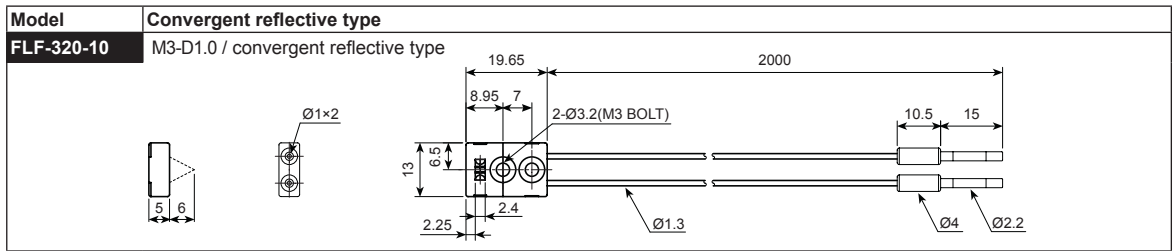
(T) Software

# Fiber Optic Cable

## Dimensions

Model	Diffuse reflective type	Model	Diffuse reflective type
<b>FD-320-06B</b> Free cut Adapter	M3-D0.6 	<b>FDS2-320-05</b> Free cut Adapter	M3-D0.5 / Stainless steel Ø1.5x45mm 
<b>FDS-420-05</b> Free cut Adapter	M4-D0.5 / Stainless steel Ø1.5x90mm 	<b>FD-320-F1</b> Free cut Adapter	Co-axial M3 / Ø0.5, Ø0.25x9 
<b>FDS2-420-05</b> Free cut Adapter	M4-D0.5 / SUS Ø1.5x45mm 	<b>FD-620-F2</b> Free cut	Co-axial M6 / Ø1.0, Ø0.265x16 
<b>FDS-620-10</b> Free cut	M6-D1.0 / SUS Ø2.5x90mm 	<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 Ø2.5x45mm 	<b>FD-620-15H1</b> Free cut	M6-D1.5 / Heat-resistant 150°C 
<b>FDP-320-10</b> Free cut	D1.0x2 / Plastic 	<b>GD-420-20H2</b> Free cut	M4-D0.05x1000 / Heat-resistant 250°C 
<b>FD-320-F</b> Free cut Adapter	Co-axial M3 / Ø0.5, Ø0.25x4 	<b>GD-620-20H2</b> Free cut	M6-D0.05x1000 / Heat-resistant 250°C 
<b>FDR-610-10R</b> Free cut	M6-D1.0 / ※Hood material: Stainless steel type 303 	<b>FDCSN-320-05</b> Free cut	Ø3 / Stainless steel Ø1.47x20 / Side view 

## ■ Dimensions



- (A) Photoelectric Sensors
- (B) Fiber Optic Sensors
- (C) Door/Area Sensors
- (D) Proximity Sensors
- (E) Pressure Sensors
- (F) Rotary Encoders
- (G) Connectors/ Connector Cables/ Sensor Distribution Boxes/ Sockets
- (H) Temperature Controllers
- (I) SSRs / Power Controllers
- (J) Counters
- (K) Timers
- (L) Panel Meters
- (M) Tacho / Speed / Pulse Meters
- (N) Display Units
- (O) Sensor Controllers
- (P) Switching Mode Power Supplies
- (Q) Stepper Motors & Drivers & Controllers
- (R) Graphic/ Logic Panels
- (S) Field Network Devices
- (T) Software



# 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 / Stainless steel Ø1.5×90m 
<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 / Stainless steel Ø1.5×45m 
<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-D1.5 / 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>FTR-410-10R</b> Free cut	M4-D1.0 ※Hood material: Stainless steel type 303 
<b>FTW11-210-10R</b> Free cut	M2-D1.0 	<b>FTCSN-2520-05</b> Free cut	Ø2.47-D0.5 / Stainless steel 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.

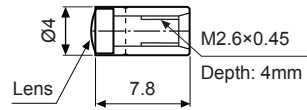
### ◎ Ambient temperature range of lens unit

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

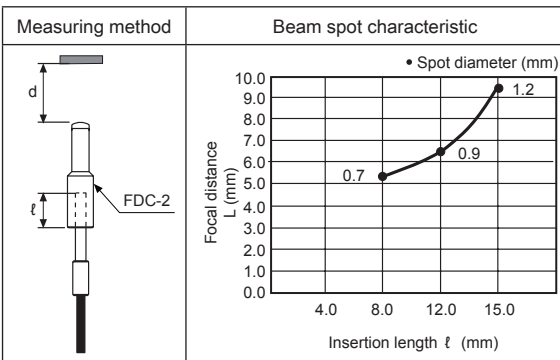


## ■ Micro Spot Fiber Optic Cable And Lens Unit (sold separately)

### ◎ Model

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

### ◎ Feature data

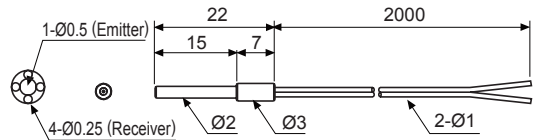


### ◎ Ambient temperature range of lens unit

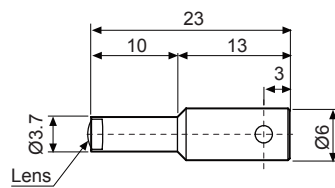
It should be used within -40 to 100°C. (not over 100°C.)

### ◎ 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

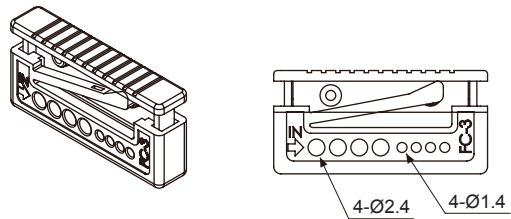
※Additional 8mm is for tube coupling.

## ■ Accessory

### ◎ Fiber cutter

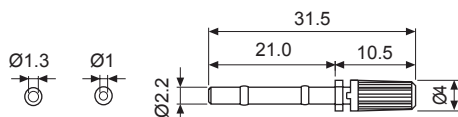
Applications: Cutting fiber optic cable, free cut type

#### • FC-3



### ◎ Adapter

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



※The inside diameter Ø1 (standard and black)

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

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