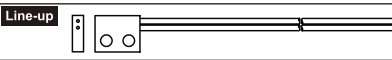
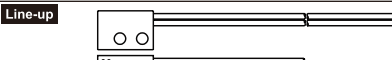
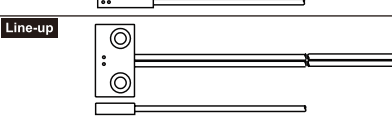
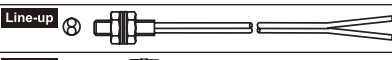
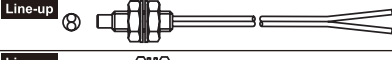
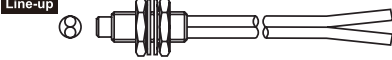
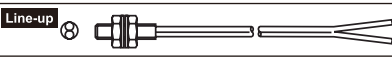



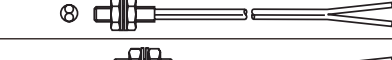

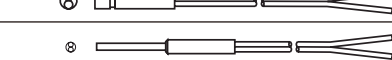






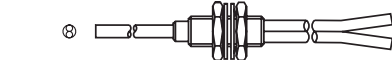




Fiber Optic Cable

Specifications (diffuse reflective type)

(based on Non-glossy white paper)

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

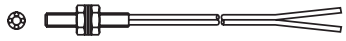
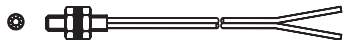
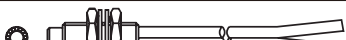
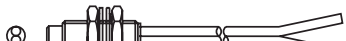
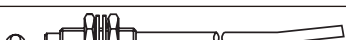

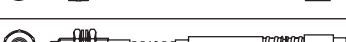
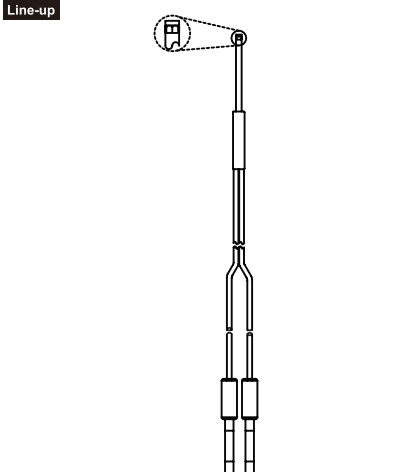
(T) Software

(U) Other

Fiber Optic Cable

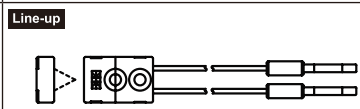
■ Specifications (diffuse reflective type)

(based on Non-glossy white paper)

Type	Appearance	Feature	Model	Sensing distance (mm)	Min. sensing target ^{※3}	Allowable bend radius	Cable length(L) ^{※4}	Temp.
Coaxial type		M3 Bolt	FD-320-F	40 ^{※2}	Ø0.03	R15	2m Free cut	-40 to 70°C
		M3 Bolt	FD-320-F1	60 ^{※2}				
		M6 Bolt	FD-620-F2	120 ^{※2}				
Heat-resistant type		M6 Bolt	FD-620-10H	120 ^{※2}		R30	-40 to 105°C	
		M6 Bolt	FD-620-15H1	160 ^{※2}		R30		-40 to 150°C
		M4 Bolt Glass type	GD-420-20H2	100 ^{※2}		R50	2m	-40 to 250°C
		M4 Bolt Glass type	GD-620-20H2					
Side view		Ø3 Cylinder type	FDCSN-320-05	30 ^{※1}	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 ^{※3}	Allowable bend radius	Cable length(L) ^{※4}	Temp.
Convergent reflective type		Convergent reflective type	FLF-320-10	8 ^{※1}	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.

Fiber Optic Cable

■ Specifications (through-beam type)

(based on Non-glossy white paper)

Type	Appearance	Feature	Model	Sensing distance (mm)	Min. sensing target ^{※3}	Allowable bend radius	Cable length(L) ^{※4}	Temp.
Flexible type ^{※5}	Line-up	Flat type /Top view	FTFU-210-05R	110 ^{※1}	Ø0.04	R1	1m	-40 to 60°C
	Line-up	Flat type /Side view	FTFN-210-05R					
	Line-up	Flat type /Flat view	FTF-210-05R	100 ^{※1}				
	Line-up	Flat type /Top+Side view	FTFB-210-05R	110 ^{※1}				
	Line-up	Integrated bracket(L type) /Top view	FTLU-310-10R	500 ^{※1}				
	Line-up		FTLU1-310-10R					
	Line-up		FTLU2-310-10R					
	Line-up	M3 Bolt	FT-320-05R	110 ^{※1}				
Line-up	Ø2 Cylinder type	FTC-220-05R	110 ^{※1}	Ø0.3				
Line-up	M4 Bolt	FT-420-10R	500 ^{※1}	Ø0.5				
Flexible type ^{※5}	Line-up	M3 Bolt	FT-320-06B	110 ^{※2}	Ø0.3	R5	2m	-40 to 60°C
	Line-up	Ø1.5 Cylinder type	FTC-1520-06B					
	Line-up	M4 Bolt	FT-420-13B	400 ^{※2}				

※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 ^{※3}	Allowable bend radius	Cable length(L) ^{※4}	Temp.
Standard type		M3 Bolt	FT-320-05	150 ^{※2}	Ø0.5	R15	2m Free cut	-40 to 70°C
	Line-up 	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 ^{※2}	Ø1	R30		
		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			R30 (SUS part 10R)		
Heat-resistant type		M4 Bolt	FT-420-10H	300 ^{※2}		R30		-40 to 105°C
		M4 Bolt	FT-420-15H1	500 ^{※2}		R50		-40 to 150°C
		M4 Bolt Glass type	GT-420-13H2	400 ^{※2}		R25	2m	-40 to 50°C
Side view	Line-up 	Ø2.47 Cylinder type	FTCSN-2520-05	120 ^{※1}	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.

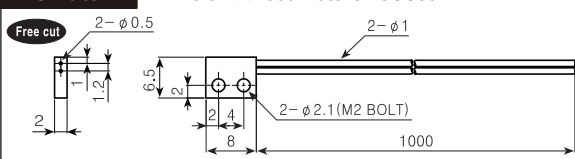
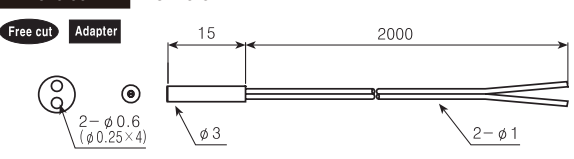
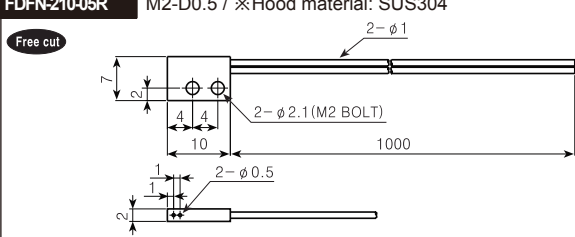
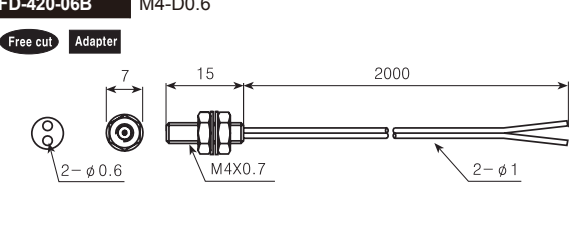
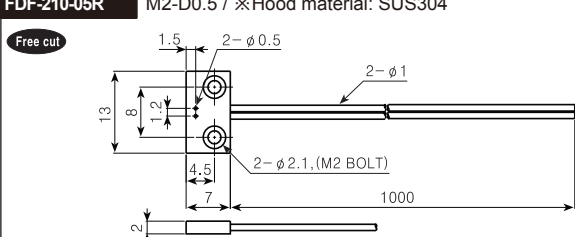
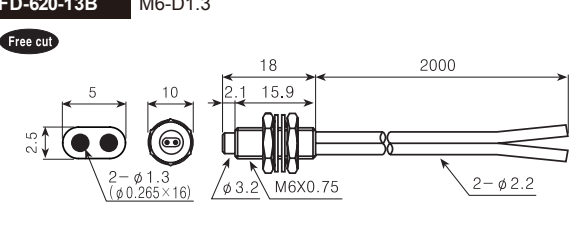
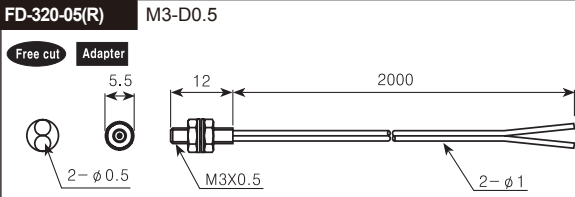
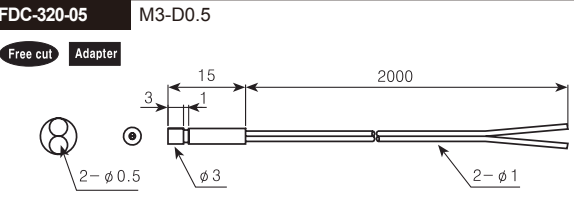
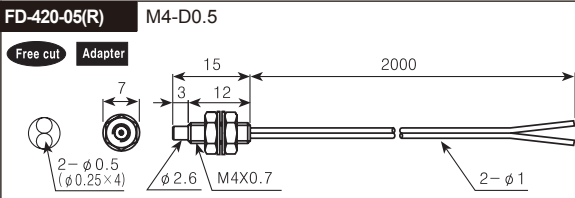
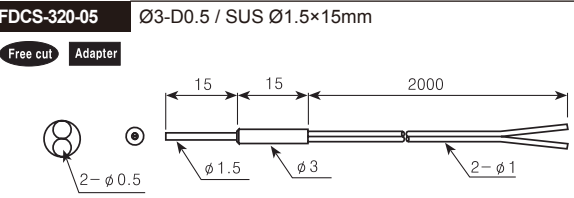
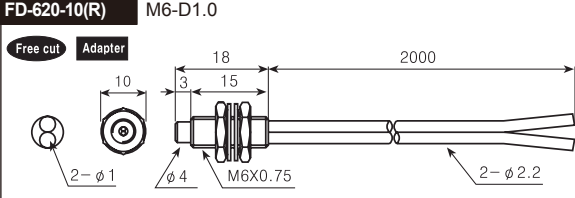
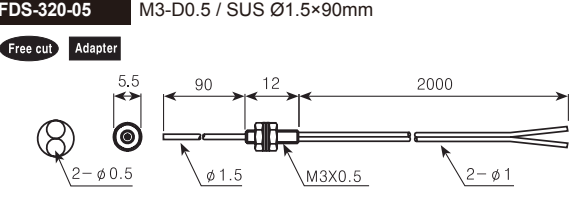
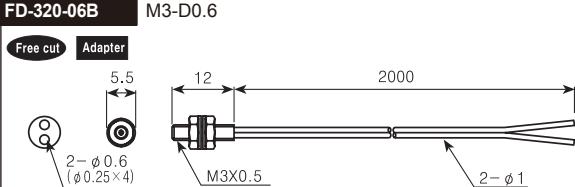
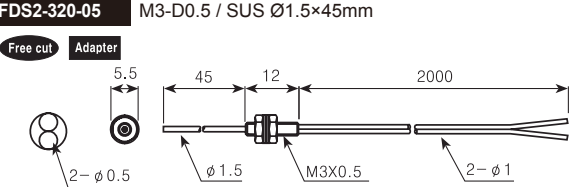
※4: Fiber optic cable out of the rated length can be customizable.

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

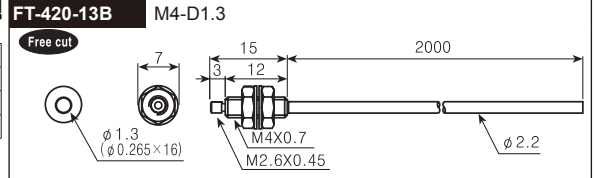
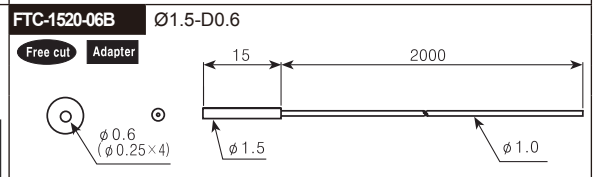
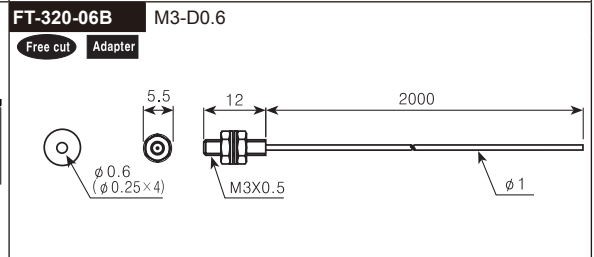
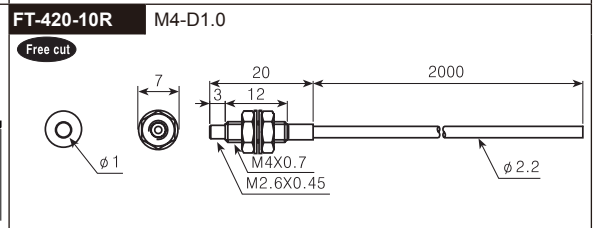
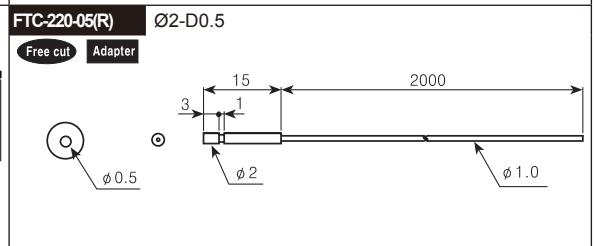
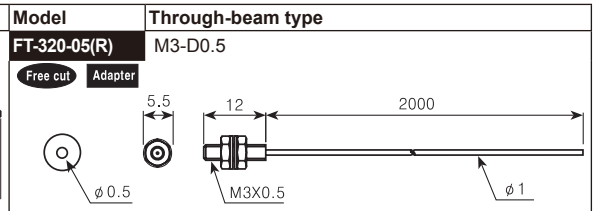
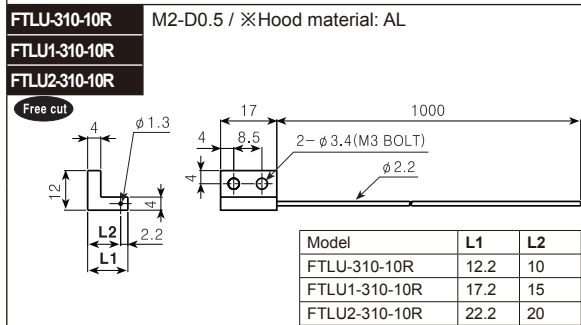
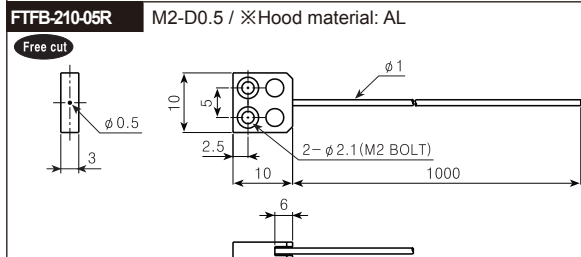
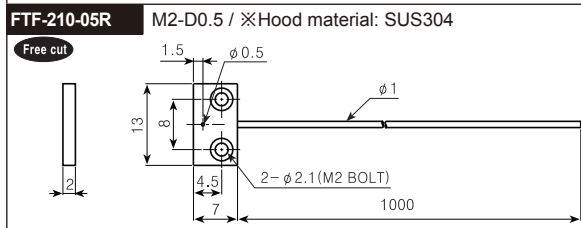
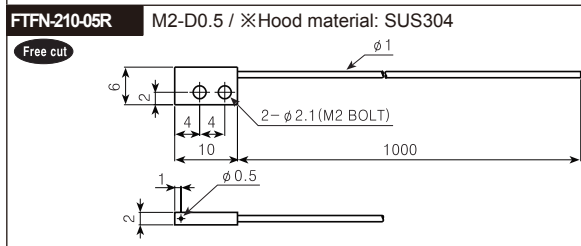
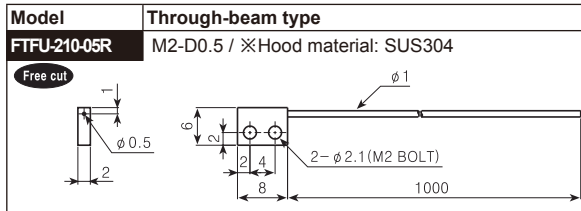
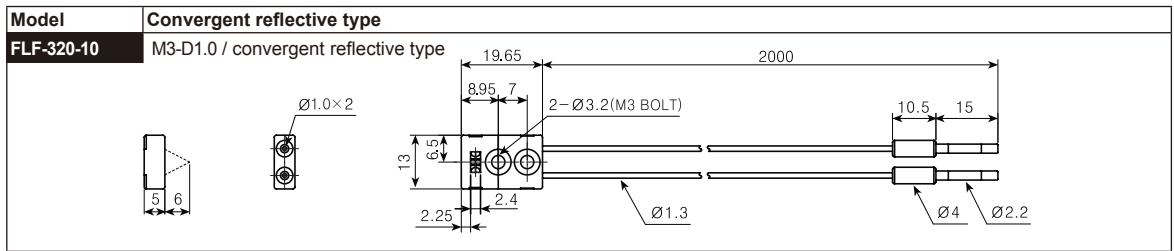
- (A) Photo electric sensor
- (B) Fiber optic sensor
- (C) Door/Area sensor
- (D) Proximity sensor
- (E) Pressure sensor
- (F) Rotary encoder
- (G) Connector/Socket
- (H) Temp. controller
- (I) SSR/ Power controller
- (J) Counter
- (K) Timer
- (L) Panel meter
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- (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

Fiber Optic Cable

Dimensions

Model	Diffuse reflective type	Model	Diffuse reflective type
FDS-420-05 Free cut Adapter	M4-D0.5 / SUS Ø1.5×90mm 	FD-320-F1 Free cut Adapter	Co-axial M3 / Ø0.5, Ø0.25×9
FDS2-420-05 Free cut Adapter	M4-D0.5 / SUS Ø1.5×45mm 	FD-620-F2 Free cut	Co-axial M6 / Ø1.0, Ø0.265×16
FDS-620-10 Free cut	M6-D1.0 / SUS Ø2.5×90mm 	FD-620-10H Free cut	M6-D1.0 / Heat-resistant 105°C
FDS2-620-10 Free cut	M6-D1.0 / SUS Ø2.5×45mm 	FD-620-15H1 Free cut	M6-D1.5 / Heat-resistant 150°C
FDP-320-10 Free cut	D1.0×2 / Plastic 	GD-420-20H2	M4-D0.05×1000 / Heat-resistant 250°C
FD-320-F Free cut Adapter	Co-axial M3 / Ø0.5, Ø0.25×4 	GD-620-20H2	M6-D0.05×1000 / Heat-resistant 250°C
FDCSN-320-05	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
FTC-1520-05 Free cut Adapter	Ø1.5-D0.5 	FTP-320-10 Free cut	D1.0 / Plastic
FTCS-220-05 Free cut Adapter	Ø2-D0.5 / SUS Ø1.0×15mm 	FTS-420-10 Free cut	M4-D1.0 / SUS Ø1.5×90m
FTS-320-05 Free cut Adapter	M3-D0.5 / SUS Ø1.0×90mm 	FTS2-420-10 Free cut	M4-D1.0 / SUS Ø1.5×45m
FTS1-320-05 Free cut Adapter	M3-D0.5 / SUS Ø1.0×35mm 	FT-420-10H Free cut	M4-D1.0 / Heat-resistant 105°C
FTS2-320-05 Free cut Adapter	M3-D0.5 / SUS Ø1.0×45mm 	FT-420-15H1 Free cut	M4-D1.0 / Heat-resistant 150°C
FT-420-10 Free cut	M4-D1.0 	GT-420-13H2 Free cut	M4-D1.3 / Heat-resistant Max. 250°C / Glass
FTC-320-10 Free cut	Ø3-D1.0 	FTCSN-2520-05 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.

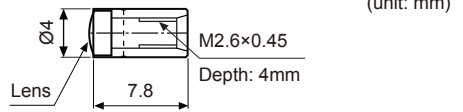
◎ Ambient temperature range of lens unit

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

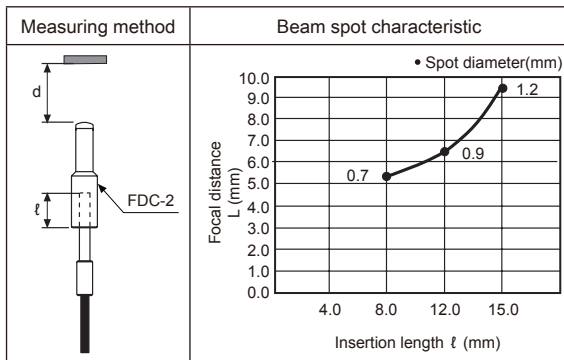


■ Micro spot fiber optic cable and lens unit(sold separately)

◎ Model

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

◎ Feature data

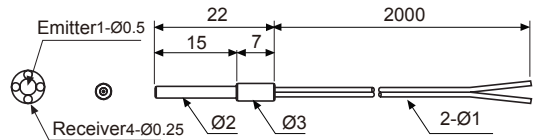


◎ Ambient temperature range of lens unit

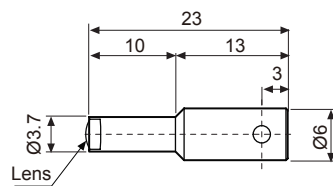
It should be used within -40 to 100°C. (not over 100°C.)

◎ 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.

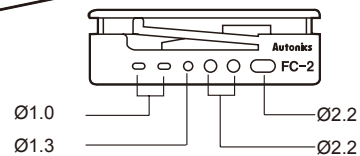
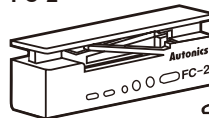
※Additional 8mm is for tube coupling.

■ Accessory

◎ Fiber cutter

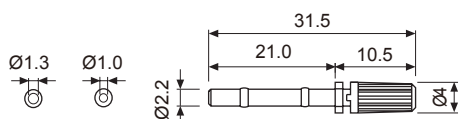
Applications: Cutting fiber optic cable, free cut type

• 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.)

(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/Socket

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