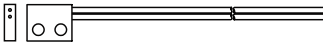
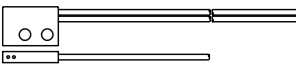
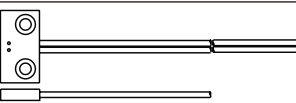
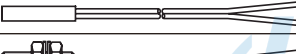
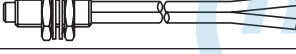
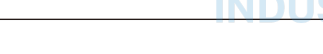
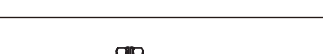
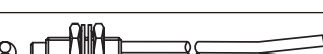
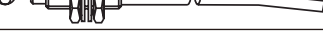


■ Specifications (diffuse reflective type)

(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	Line-up 	Flat type /Top view	FDFU-210-05R	35 ^{※1}	Ø0.0125	R1	1m Free cut	-40 to 60°C		
	Line-up 	Flat type /Side view	FDFN-210-05R	30 ^{※1}						
	Line-up 	Flat type /Flat view	FDF-210-05R							
	Line-up 	M3 Bolt	FD-320-05R	35 ^{※1}	Ø0.0125	R5	2m Free cut			
	Line-up 	M4 Bolt	FD-420-05R	130 ^{※1}						
	Line-up 	M6 Bolt	FD-620-10R						Ø0.04	
Break-resistant type ※5	Line-up 	M3 Bolt	FD-320-06B	35 ^{※2}	Ø0.0125	R5	2m Free cut			
	Line-up 	Ø3 Cylinder type	FDC-320-06B							
	Line-up 	M4 Bolt	FD-420-06B	100 ^{※2}						
	Line-up 	M6 Bolt	FD-620-13B							
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	120 ^{※2}		15R (SUS part 10R)				
		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			30R (SUS part 10R)				
		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

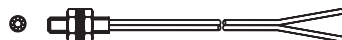
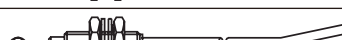
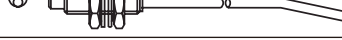
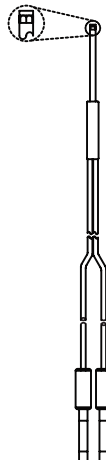
(S) Field network device

(T) Software

(U) Other

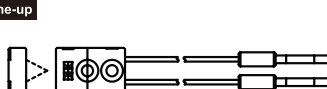
■ Specifications (diffuse reflective type)

(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}		R30		
Heat-resistant type		M6 Bolt	FD-620-10H			R30	-40 to 105°C	
		M6 Bolt	FD-620-15H1	160 ^{※2}		-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	Line-up 	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.

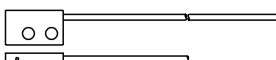
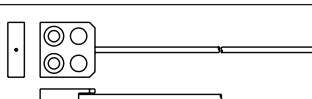
※4: Fiber optic cable out of the rated length can be customizable.

※**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.

■ 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 Free cut	-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 FTLU1-310-10R FTLU2-310-10R	500 ^{※1}	Ø0.06			
	Line-up 	M3 Bolt	FT-320-05R	110 ^{※1}	Ø0.3			
	Line-up 	Ø2 Cylinder type	FTC-220-05R					
	Line-up 	M4 Bolt	FT-420-10R	500 ^{※1}	Ø0.5		2m Free cut	
Flexible type ^{※5}	Line-up 	M3 Bolt	FT-320-06B	110 ^{※2}	Ø0.3	R5		
	Line-up 	Ø1.5 Cylinder type	FTC-1520-06B					
	Line-up 	M4 Bolt	FT-420-13B	400 ^{※2}	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 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

■ 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℃
	Line-up	Ø1.5 Cylinder type	FTC-1520-05					
		Ø2 Cylinder type	FTC-220-05					
		Ø2 Cylinder type SUS type (90mm)	FTCS-220-05			R15 (SUS part 10R)		
		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			R30 (SUS part 10R)		
		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※2		R30	2m	-40 to 105℃
		M4 Bolt	FT-420-15H1	500※2		R50		-40 to 150℃
		M4 Bolt Glass type	GT-420-13H2	400※2		R25	-40 to 50℃	
Side view	Line-up	Ø2.47 Cylinder type	FTCSN-2520-05	120※1	Ø0.0125	R15	2m	-40 to 60℃

※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.

■ Dimensions

Model	Diffuse reflective type	Model	Diffuse reflective type
FDFU-210-05R	M2-D0.5 / ※Hood material: SUS304	FDC-320-06B	M3-D0.6
FDNF-210-05R	M2-D0.5 / ※Hood material: SUS304	FD-420-06B	M4-D0.6
FDF-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	FDCS-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

(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

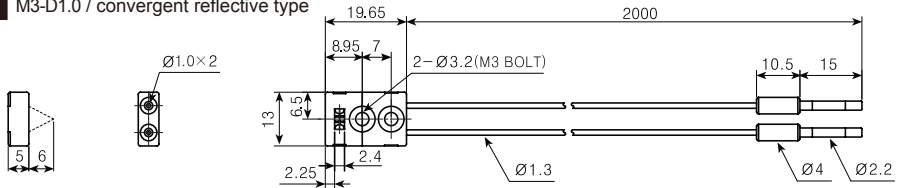
(T) Software

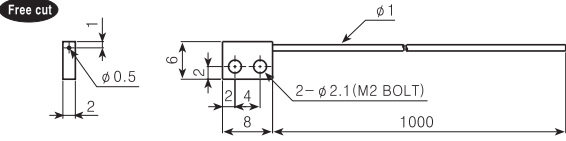
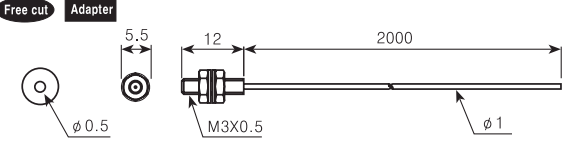
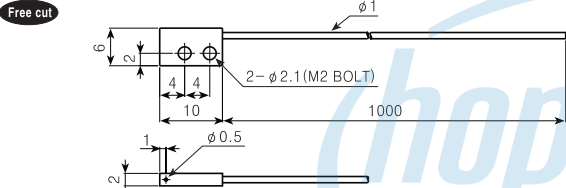
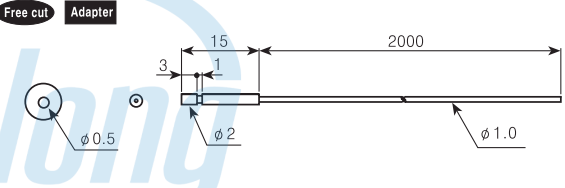
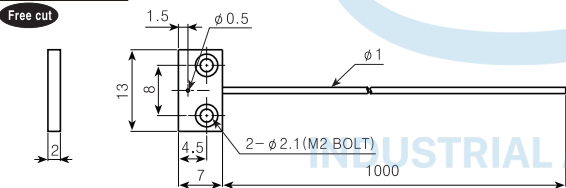
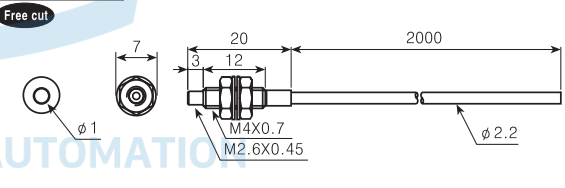
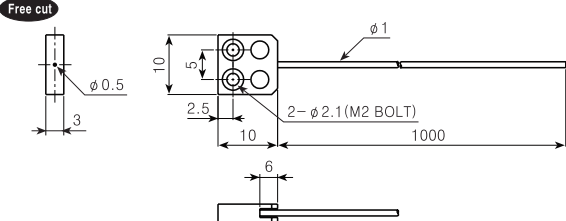
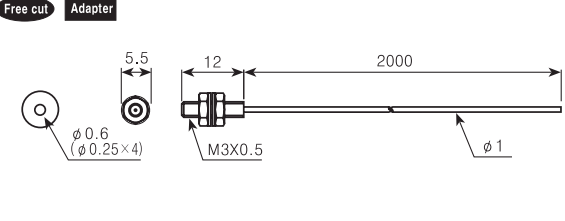
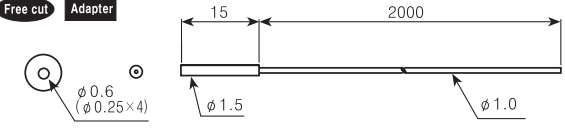
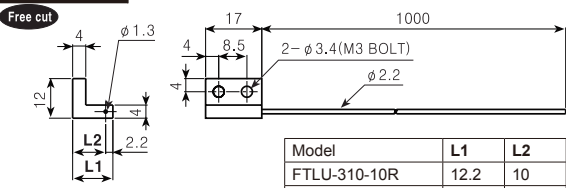
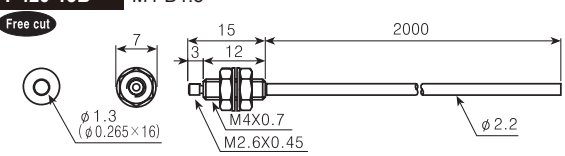
(U) Other

■ 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
FDSCN-320-05	Ø3 / SUS Ø1.47×20 / Side view 		

■ Dimensions

Model	Convergent reflective type
FLF-320-10	M3-D1.0 / convergent reflective type
	

Model	Through-beam type	Model	Through-beam type												
FTFU-210-05R	M2-D0.5 / ※Hood material: SUS304	FT-320-05(R)	M3-D0.5												
															
FTFN-210-05R	M2-D0.5 / ※Hood material: SUS304	FTC-220-05(R)	Ø2-D0.5												
															
FTF-210-05R	M2-D0.5 / ※Hood material: SUS304	FT-420-10R	M4-D1.0												
															
FTFB-210-05R	M2-D0.5 / ※Hood material: AL	FT-320-06B	M3-D0.6												
															
FTLU-310-10R	M2-D0.5 / ※Hood material: AL	FTC-1520-06B	Ø1.5-D0.6												
FTLU1-310-10R															
FTLU2-310-10R															
															
	<table><tr><th>Model</th><th>L1</th><th>L2</th></tr><tr><td>FTLU-310-10R</td><td>12.2</td><td>10</td></tr><tr><td>FTLU1-310-10R</td><td>17.2</td><td>15</td></tr><tr><td>FTLU2-310-10R</td><td>22.2</td><td>20</td></tr></table>	Model	L1	L2	FTLU-310-10R	12.2	10	FTLU1-310-10R	17.2	15	FTLU2-310-10R	22.2	20		
Model	L1	L2													
FTLU-310-10R	12.2	10													
FTLU1-310-10R	17.2	15													
FTLU2-310-10R	22.2	20													

(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

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(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

■ Dimensions

Model FTC-1520-05 Through-beam type $\varnothing 1.5$ -D0.5 Free cut Adapter 	Model FTP-320-10 Through-beam type D1.0 / Plastic Free cut
FTCS-220-05 $\varnothing 2$ -D0.5 / SUS $\varnothing 1.0 \times 15$ mm Free cut Adapter 	FTS-420-10 M4-D1.0 / SUS $\varnothing 1.5 \times 90$ mm Free cut
FTS-320-05 M3-D0.5 / SUS $\varnothing 1.0 \times 90$ mm Free cut Adapter 	FTS2-420-10 M4-D1.0 / SUS $\varnothing 1.5 \times 45$ m Free cut
FTS1-320-05 M3-D0.5 / SUS $\varnothing 1.0 \times 35$ mm Free cut Adapter 	FT-420-10H M4-D1.0 / Heat-resistant 105°C Free cut
FTS2-320-05 M3-D0.5 / SUS $\varnothing 1.0 \times 45$ mm Free cut Adapter 	FT-420-15H1 M4-D1.0 / Heat-resistant 150°C Free cut
FT-420-10 M4-D1.0 Free cut 	GT-420-13H2 M4-D1.3 / Heat-resistant Max. 250°C / Glass Glass fiber with $\varnothing 2.9$ sus protective armor.
FTC-320-10 $\varnothing 3$ -D1.0 Free cut 	FTCSN-2520-05 $\varnothing 2.47$ -D0.5 / SUS $\varnothing 0.8 \times 15$ mm / 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.

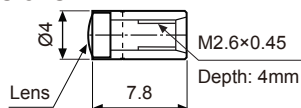
◎ Ambient temperature range of lens unit

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



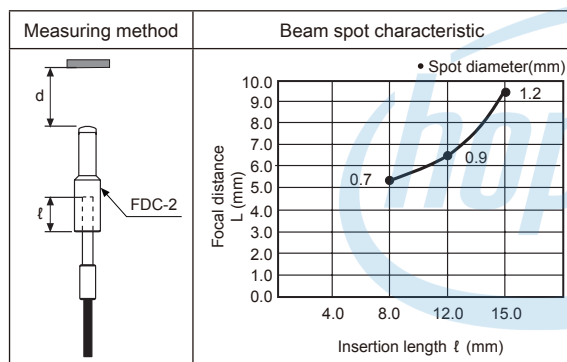
(unit: mm)

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

◎ Model

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

◎ Feature data



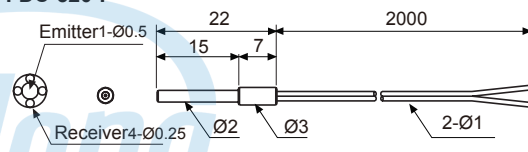
◎ Ambient temperature range of lens unit

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

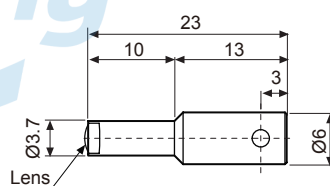
◎ Dimensions

(unit:mm)

• 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.

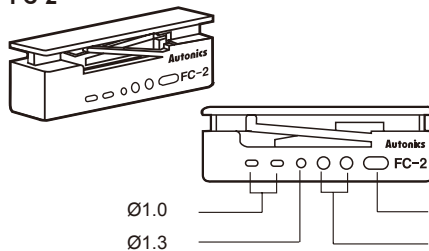
※Additional 8mm is for tube coupling.

■ Accessory

◎ Fiber cutter

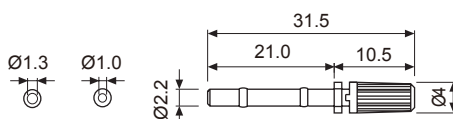
Applications: Cutting fiber optic cable, free cut type

• FC-2



◎ Adapter

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



※The inside diameter 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

(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