





















■ Diffuse Reflective Type

(based on Non-glossy white paper)

Type	Appearance	Feature	Sensing distance (mm)	Min. Sensing Target ^{※3}	Allowable Bend Radius	Cable length (L)	Ambient Temperature	Model	
Bolt type	Standard type	 M3	40 ^{※2}	Ø0.03	R15	1m (Free cut)	-40 to 70°C	FD-310-05	
		 M3	40 ^{※2}	Ø0.03	R15	2m (Free cut)	-40 to 70°C	FD-320-05	
		 M4	40 ^{※2}	Ø0.03	R15	2m (Free cut)	-40 to 70°C	FD-420-05	
		 M3 (SUS type, 90mm)	40 ^{※2}	Ø0.03	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 ^{※2}	Ø0.03	R15 (SUS part R10)	2m (Free cut)	-40 to 70°C	FDS-420-05	
	 M4 (SUS type, 45mm)	FDS2-420-05							
	 M6	M6	120 ^{※2}	Ø0.03	R30	2m (Free cut)	-40 to 70°C	FD-620-10	
		 M6 (SUS type, 90mm)	120 ^{※2}	Ø0.03	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 ^{※2}	Ø0.03	R30	2m (Free cut)	-40 to 105°C	FD-620-10H
		 M6	M6	160 ^{※2}	Ø0.03	R50	2m (Free cut)	-40 to 150°C	FD-620-15H1
		 M4 (Glass type)	100 ^{※2}	Ø0.03	R50	2m	-40 to 250°C	GD-420-20H2	
		 M6 (Glass type)						GD-620-20H2	
	Flexible type ^{※4}	 M3	M3	35 ^{※1}	Ø0.0125	R1	2m (Free cut)	-40 to 60°C	FD-320-05R
 M4		M4	FD-420-05R						
 M6		M6	130 ^{※1}						Ø0.04
Break-resistant type ^{※4}	 M3	M3	35 ^{※2}	Ø0.0125	R5	2m (Free cut)	-40 to 60°C	FD-320-06B	
	 M4	M4						FD-420-06B	
	 M6	M6						100 ^{※2}	Ø0.0125

※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.]







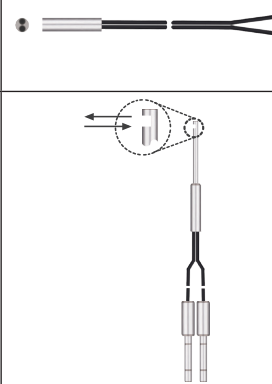




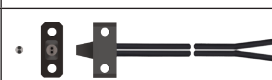
※Glass type is for BF5, BF4 Series.

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

■ Convergent Reflective Type

(based on Non-glossy white paper)

Type	Appearance	Feature	Sensing distance (mm)	Min. Sensing Target ^{※3}	Allowable Bend Radius	Cable length (L)	Ambient Temperature	Model	
Flat type	Standard type		Convergent reflective type	8 ^{※1}	Ø0.0125	R25	2m	-40 to 60°C	FLF-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: **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 ^{※3}	Allowable Bend Radius	Cable length (L)	Ambient Temperature	Model
Bolt type	Standard type	M3	150 ^{※2}	∅0.5	R15	1m (Free cut)	-40 to 70°C	FT-310-05
		M3	150 ^{※2}	∅0.5	R15	2m (Free cut)	-40 to 70°C	FT-320-05
		M3 (SUS type, 90mm)	150 ^{※2}	∅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 ^{※2}	∅1	R30	2m (Free cut)	-40 to 70°C	FT-420-10
	M4 (SUS type, 90mm)	500 ^{※2}	∅1	R30 (SUS part 10)	2m (Free cut)	-40 to 70°C	FTS-420-10	
	M4 (SUS type, 45mm)	500 ^{※2}	∅1	R30 (SUS part 10R)	2m (Free cut)	-40 to 70°C	FTS2-420-10	
	Heat-resistant type	M4	300 ^{※2}	∅1	R30	2m (Free cut)	-40 to 105°C	FT-420-10H
		M4	500 ^{※2}	∅1	R50	2m (Free cut)	-40 to 150°C	FT-420-15H1
		M4 (Glass type)	400 ^{※2}	∅1	R25	2m	-40 to 250°C	GT-420-13H2
	Flexible type ^{※4}	M3	110 ^{※1}	∅0.3	R1	2m (Free cut)	-40 to 60°C	FT-320-05R
		M4	500 ^{※1}	∅0.5	R1	2m (Free cut)	-40 to 60°C	FT-420-10R
	Break-resistant type ^{※4}	M3	110 ^{※1}	∅0.3	R5	2m (Free cut)	-40 to 60°C	FT-320-06B
M4		400 ^{※1}	∅0.6	R5	2m (Free cut)	-40 to 60°C	FT-420-13B	
Cylinder type	Standard type	∅1.5mm	150 ^{※2}	∅0.5	R15	2m (Free cut)	-40 to 70°C	FTC-1520-05
		∅2mm	150 ^{※2}	∅0.5	R15	2m (Free cut)	-40 to 70°C	FTC-220-05
		∅2mm (SUS type, 15mm)	150 ^{※2}	∅0.5	R15 (SUS part10R)	2m (Free cut)	-40 to 70°C	FTCS-220-05
		∅3mm	150 ^{※2}	∅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

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(H) Temperature Controllers

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(O) Sensor Controllers

(P) Switching Mode Power Supplies

(Q) Stepper Motors & Drivers & Controllers

(R) Graphic/ Logic Panels



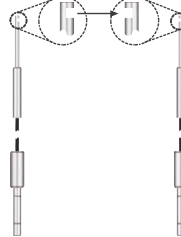



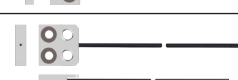


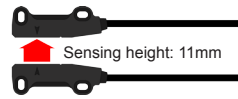

(S) Field Network Devices

(T) Software

Fiber Optic Cable

■ Through-Beam Type

(based on Non-glossy white paper)

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

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• **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.

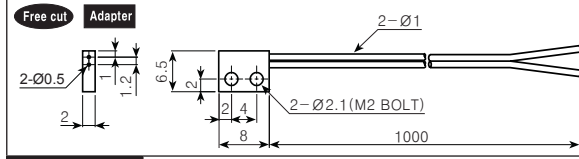
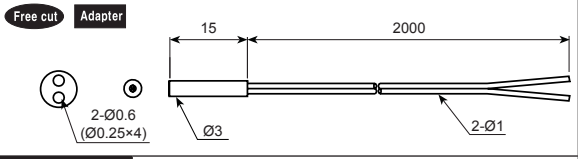
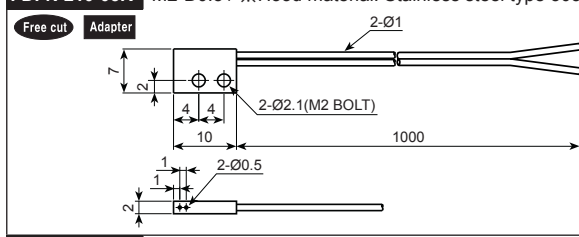
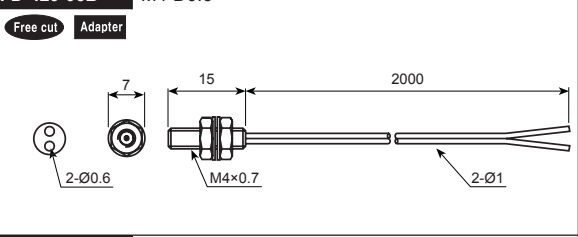
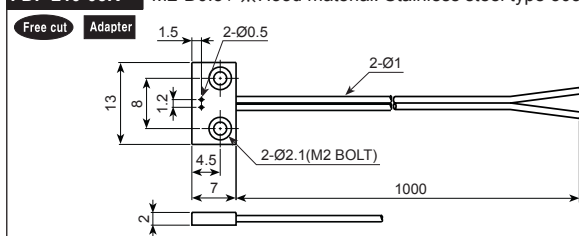
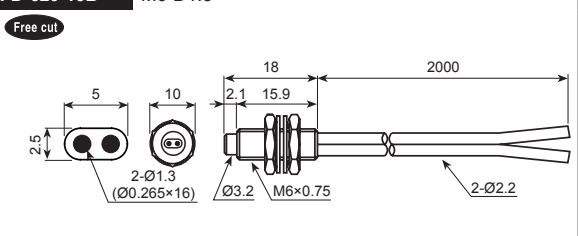
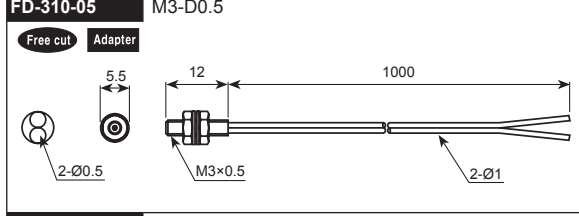
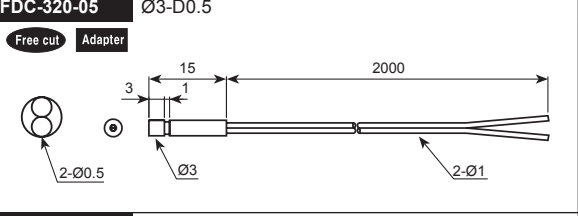
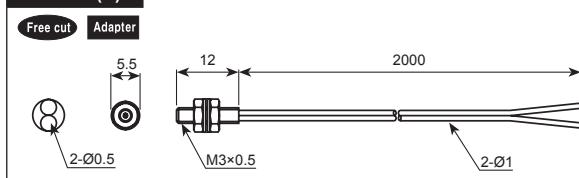
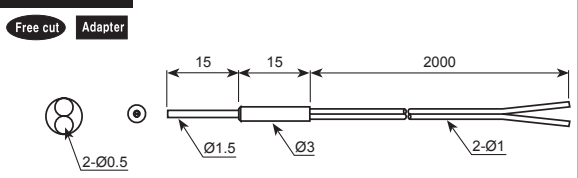
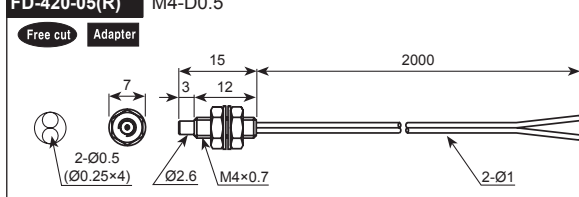
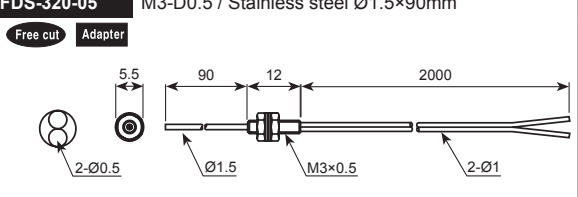
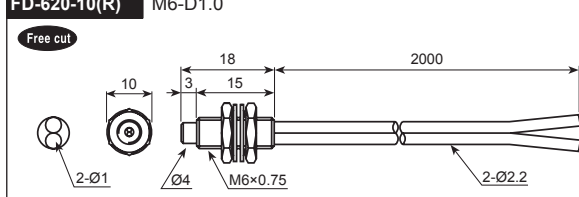
※5: The sensing distance is a standard for BF5 Series, and it is varied by operation mode.

(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
DFDU-210-05R	M2-D0.5 / ※Hood material: Stainless steel type 303 	FDC-320-06B	M3-D0.6 
DFDN-210-05R	M2-D0.5 / ※Hood material: Stainless steel type 303 	FD-420-06B	M4-D0.6 
DFD-210-05R	M2-D0.5 / ※Hood material: Stainless steel type 303 	FD-620-13B	M6-D1.3 
FD-310-05	M3-D0.5 	FDC-320-05	Ø3-D0.5 
FD-320-05(R)	M3-D0.5 	FDCS-320-05	Ø3-D0.5 / Stainless steel Ø1.5x15mm 
FD-420-05(R)	M4-D0.5 	FDS-320-05	M3-D0.5 / Stainless steel Ø1.5x90mm 
FD-620-10(R)	M6-D1.0 		

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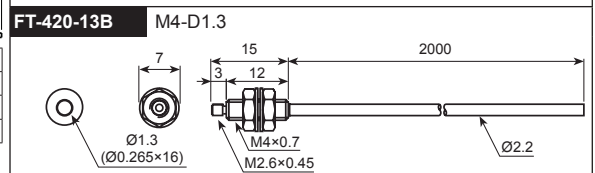
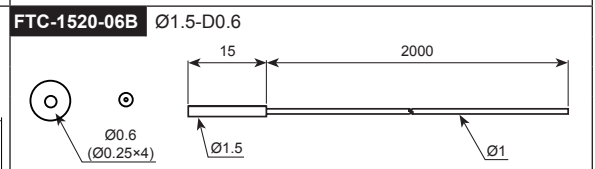
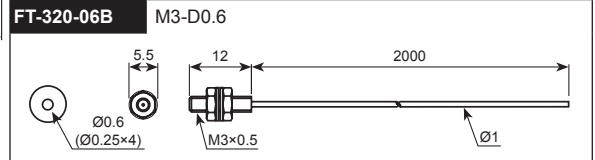
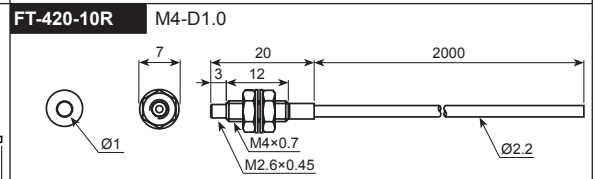
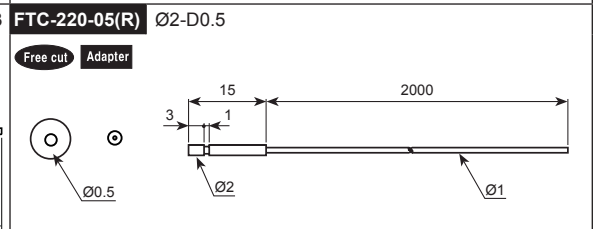
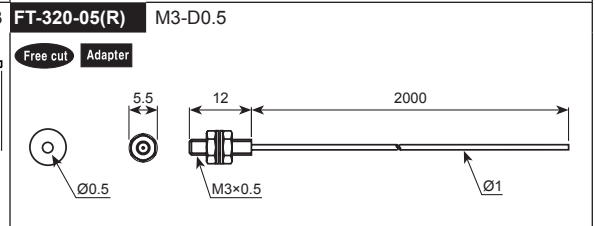
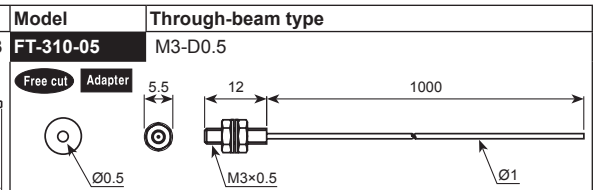
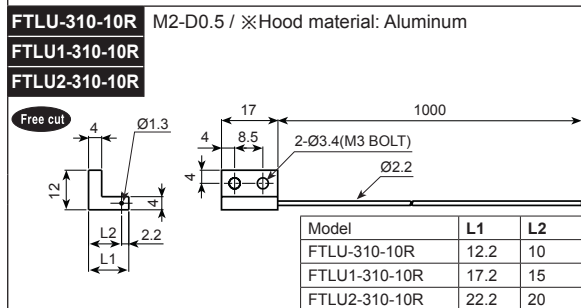
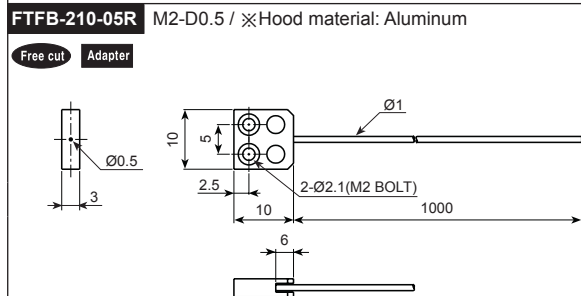
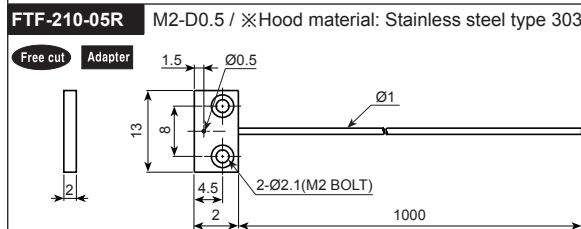
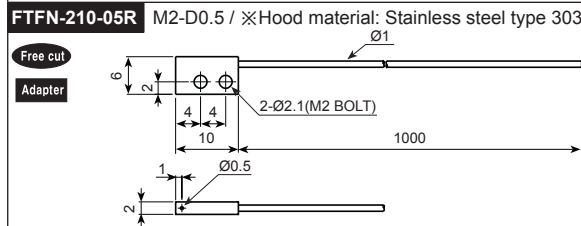
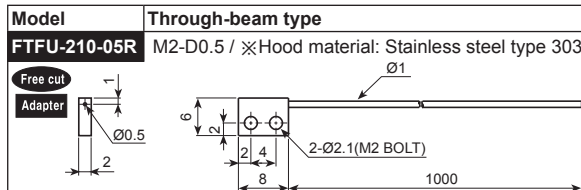
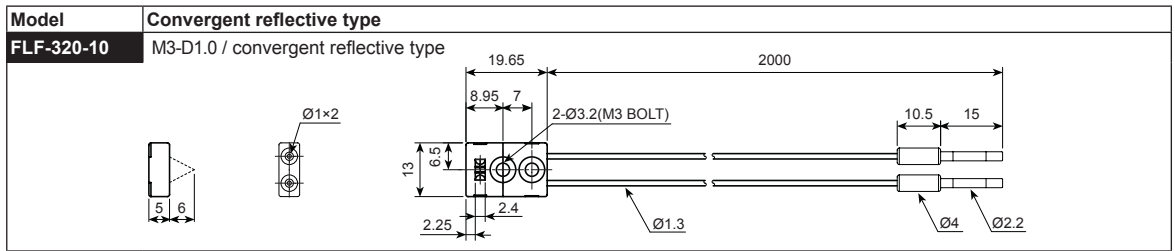
(T) Software

Fiber Optic Cable

Dimensions

Model	Diffuse reflective type	Model	Diffuse reflective type
FD-320-06B Free cut Adapter	M3-D0.6 	FDS2-320-05 Free cut Adapter	M3-D0.5 / Stainless steel Ø1.5x45mm
FDS-420-05 Free cut Adapter	M4-D0.5 / Stainless steel Ø1.5x90mm 	FD-320-F1 Free cut Adapter	Co-axial M3 / Ø0.5, Ø0.25x9
FDS2-420-05 Free cut Adapter	M4-D0.5 / SUS Ø1.5x45mm 	FD-620-F2 Free cut	Co-axial M6 / Ø1.0, Ø0.265x16
FDS-620-10 Free cut	M6-D1.0 / SUS Ø2.5x90mm 	FD-620-10H Free cut	M6-D1.0 / Heat-resistant 105°C
FDS2-620-10 Free cut	M6-D1.0 / SUS Ø2.5x45mm 	FD-620-15H1 Free cut	M6-D1.5 / Heat-resistant 150°C
FDP-320-10 Free cut	D1.0x2 / Plastic 	GD-420-20H2 Free cut	M4-D0.05x1000 / Heat-resistant 250°C
FD-320-F Free cut Adapter	Co-axial M3 / Ø0.5, Ø0.25x4 	GD-620-20H2 Free cut	M6-D0.05x1000 / Heat-resistant 250°C
FDR-610-10R Free cut	M6-D1.0 / ※Hood material: Stainless steel type 303 	FDCSN-320-05 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
FTC-1520-05 Free cut Adapter Ø0.5	Ø1.5-D0.5 15 2000 Ø1.5 Ø1	FTP-320-10 Free cut Ø1	D1.0 / Plastic 7.5 14 2000 19 13 10 4-Ø3.1 Ø2.2
FTCS-220-05 Free cut Adapter Ø0.5	Ø2-D0.5 / SUS Ø1.0×15mm 15 15 2000 Ø1 Ø2 Ø1	FTS-420-10 Free cut Ø1	M4-D1.0 / Stainless steel Ø1.5×90m 7 90 15 2000 3 12 Ø1.5 M4×0.7 Ø2.2
FTS-320-05 Free cut Adapter Ø0.5	M3-D0.5 / SUS Ø1.0×90mm 5.5 90 12 2000 Ø1.0 M3×0.5 Ø1	FTS2-420-10 Free cut Ø1	M4-D1.0 / Stainless steel Ø1.5×45m 7 45 15 2000 3 12 Ø1.5 M4×0.7 Ø2.2
FTS1-320-05 Free cut Adapter Ø0.5	M3-D0.5 / SUS Ø1.0×35mm 5.5 35 12 2000 Ø1 M3×0.5 Ø1	FT-420-10H Free cut Ø1	M4-D1.0 / Heat-resistant 105°C 7 15 2000 3 12 M2.6×0.45 M4×0.7 Ø2.2
FTS2-320-05 Free cut Adapter Ø0.5	M3-D0.5 / SUS Ø1.0×45mm 5.5 45 12 2000 Ø1.0 M3×0.5 Ø1	FT-420-15H1 Free cut Ø1.5	M4-D1.5 / Heat-resistant 150°C 7 15 2000 3 12 M2.6×0.45 M4×0.7 Ø2.2
FT-420-10 Free cut Ø1	M4-D1.0 7 20 2000 3 12 M4×0.7 M2.6×0.45 Ø2.2	GT-420-13H2 Free cut Ø1.3	M4-D1.3 / Heat-resistant Max. 250°C / Glass 7 23 2000 3 12 8 Ø2.9 Glass 13 13 Ø4 Ø2.2 M2.6×0.45 M4×0.7 Glass fiber with Ø2.9 sus protective armor.
FTC-320-10 Free cut Ø1	Ø3-D1.0 20 2000 3 11 Ø3 Ø2.2	FTR-410-10R Free cut Ø8.1 Ø1	M4-D1.0 ※Hood material: Stainless steel type 303 7 14.4 7.3 3 M2.6×0.45 M4×0.7 1000 Ø2.2
FTW11-210-10R Free cut Ø2.2	M2-D1.0 30.2 1000 2-M2 BOLT 9.8 5.8 1.4 18.6 1.4 7.2 Ø2.2	FTCSN-2520-05 Free cut Ø0.5	Ø2.47-D0.5 / Stainless steel Ø0.8×15mm / Side view 15 15 2000 10.5 15 Ø0.7 hole Ø0.8 Ø2.47 Ø1.25 Ø4 Ø2.2

■ 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.

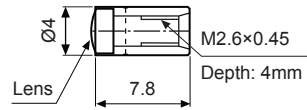
◎ Ambient temperature range of lens unit

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



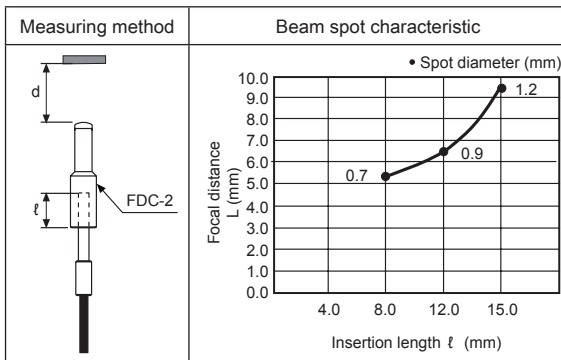
(unit: mm)

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

◎ Model

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

◎ Feature data



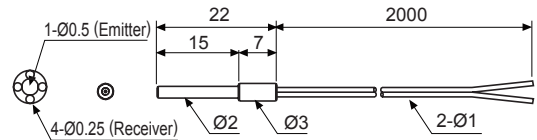
◎ Ambient temperature range of lens unit

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

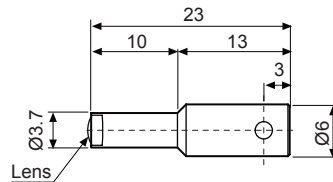
◎ Dimensions

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

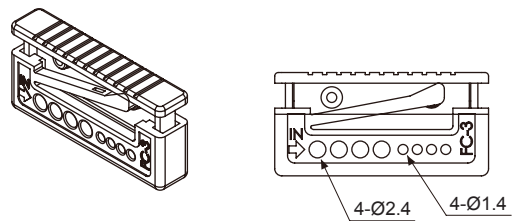
※Additional 8mm is for tube coupling.

■ Accessory

◎ Fiber cutter

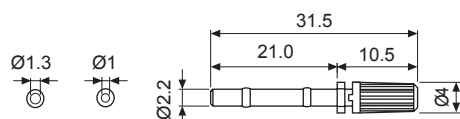
Applications: Cutting fiber optic cable, free cut type

• FC-3



◎ Adapter

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



※The inside diameter $\varnothing 1$ (standard and black)

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

(A) Photoelectric Sensors

(B) Fiber Optic Sensors

(C) Door/Area Sensors

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(H) Temperature Controllers

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