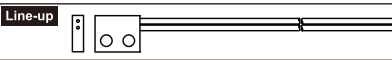
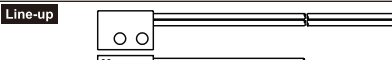
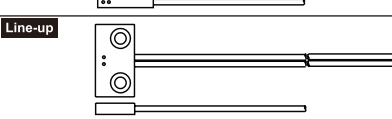
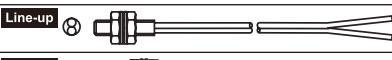
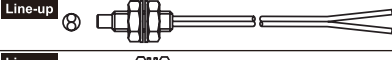
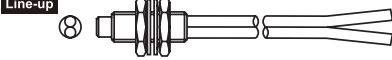
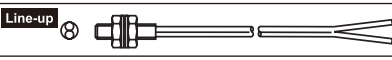



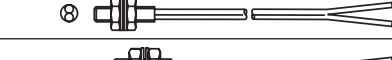

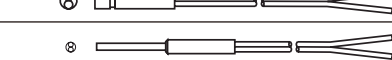






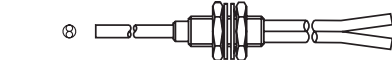




Fiber Optic Cable

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

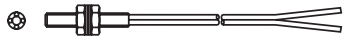
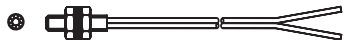
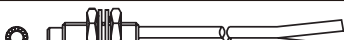
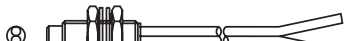
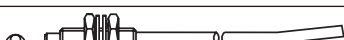

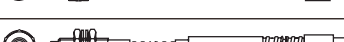
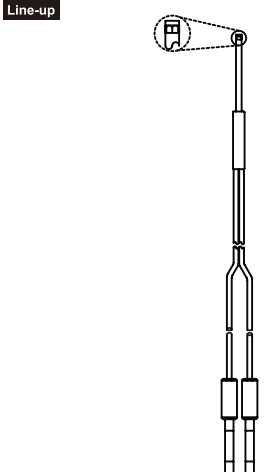
(T) Software

(U) Other

Fiber Optic Cable

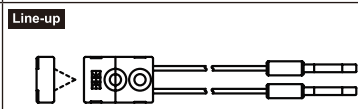
■ Specifications (diffuse reflective type)

(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} | | R30 | | |
| Heat-resistant type |  | M6 Bolt | FD-620-10H | | | 160 ^{※2} | R30 | -40 to 105°C |
| |  | M6 Bolt | FD-620-15H1 | R50 | | | -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 | -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 | 500 ^{※2} | Ø1 | R30 (SUS part 10R) | Free cut | | |
| | | 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 | Free cut | | |
| | | Ø3 Cylinder type | FTC-320-10 | | | | | | |
| | | Plastic | FTP-320-10 | | | | | | |
| | M4 Bolt SUS type(90mm) | FTS-420-10 | | | | | | | |
| Heat-resistant type | | M4 Bolt | FT-420-10H | 300 ^{※2} | R30 | R30 (SUS part 10R) | 2m | -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 | -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.

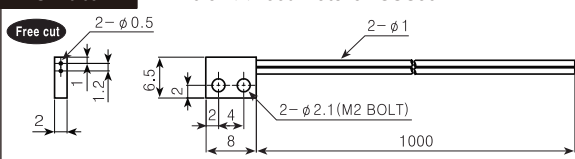
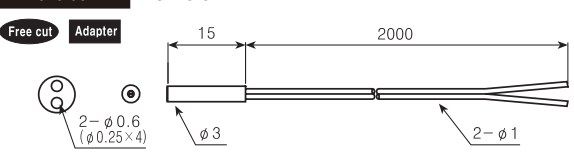
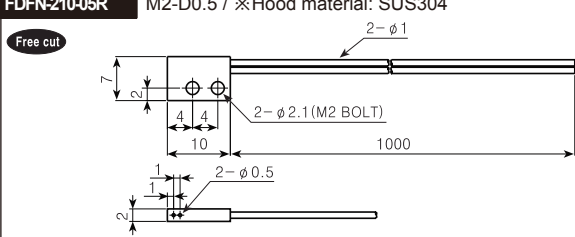
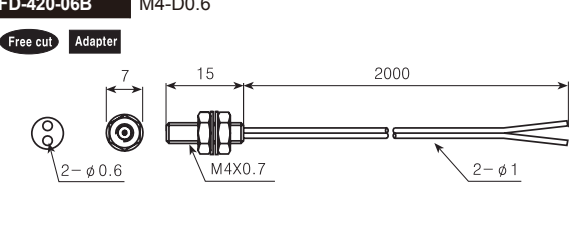
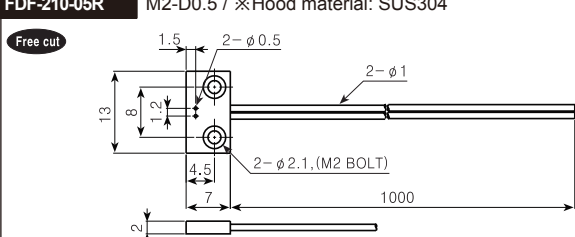
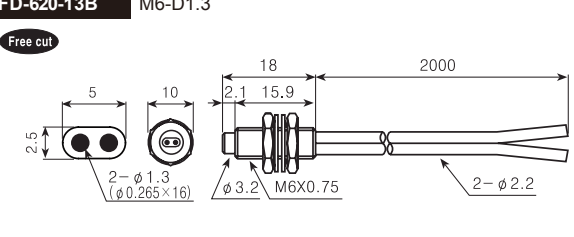
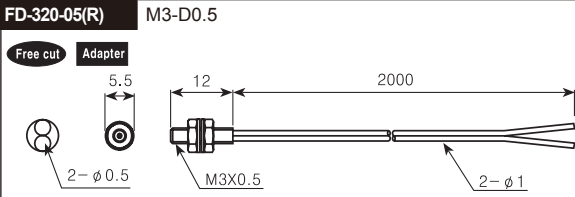
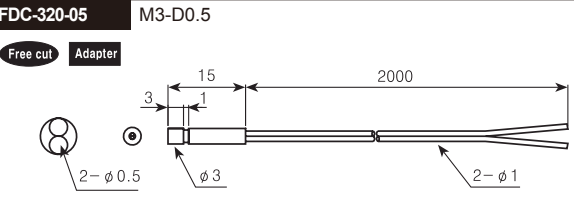
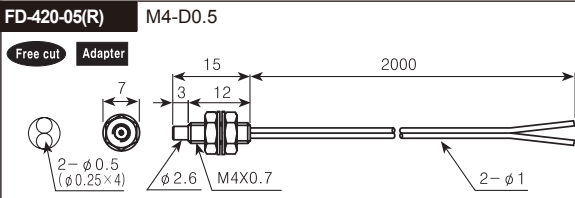
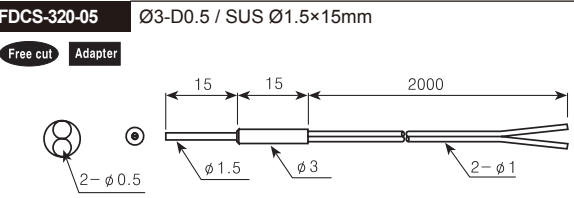
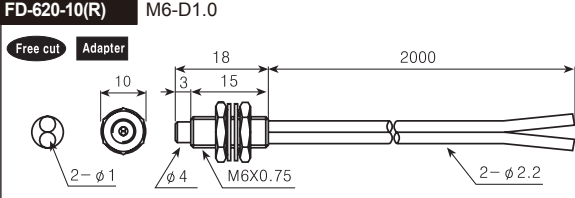
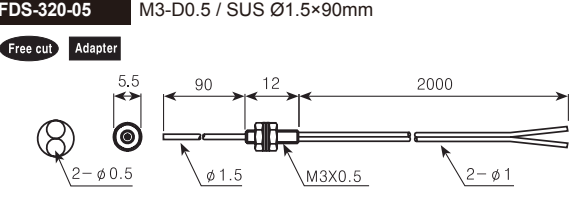
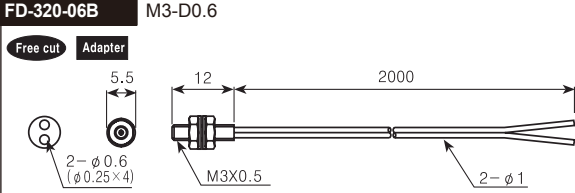
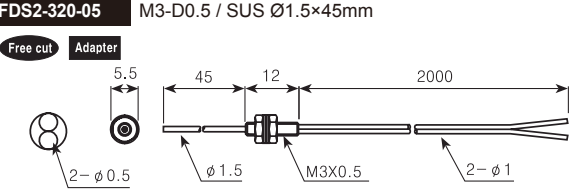
※4: Fiber optic cable out of the rated length can be customizable.

※ 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 |
|----------------------|---|--------------------|---|
| FD-FU-210-05R | M2-D0.5 / ※Hood material: SUS304  | FDC-320-06B | M3-D0.6  |
| FD-FN-210-05R | M2-D0.5 / ※Hood material: SUS304  | FD-420-06B | M4-D0.6  |
| FD-F-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  |

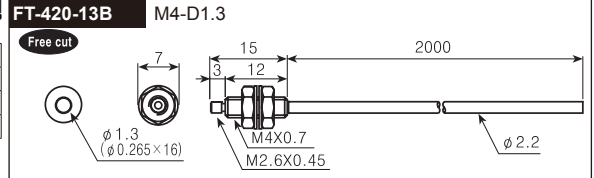
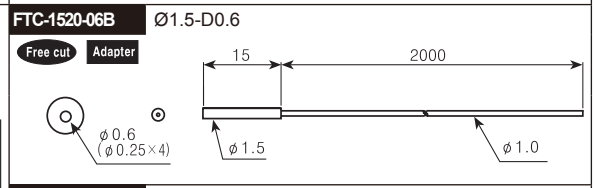
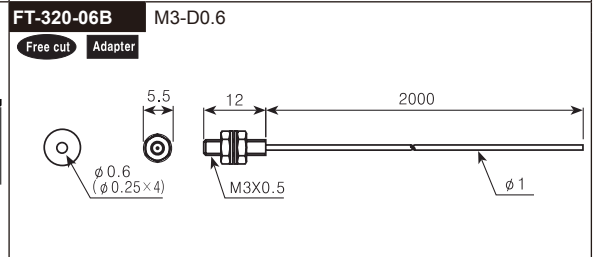
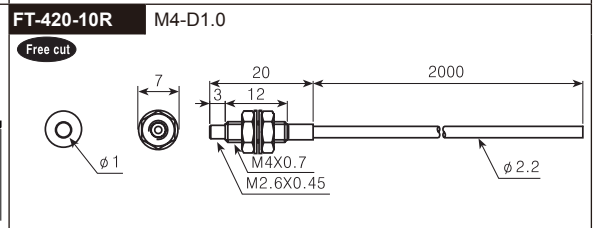
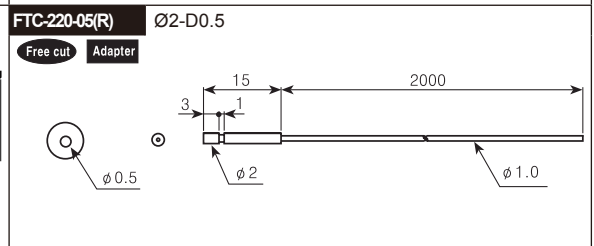
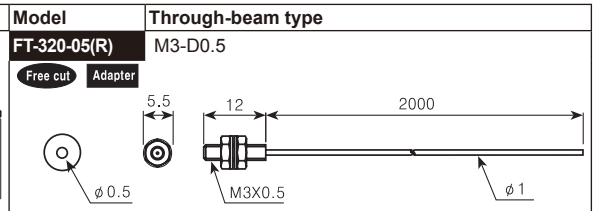
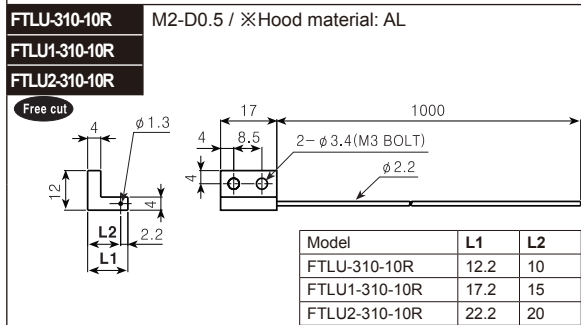
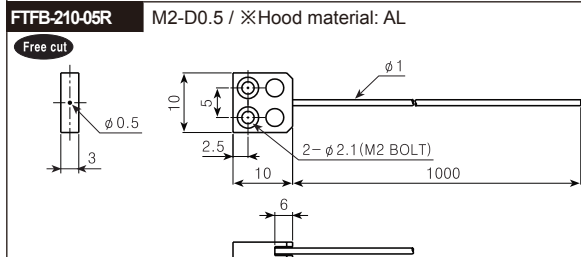
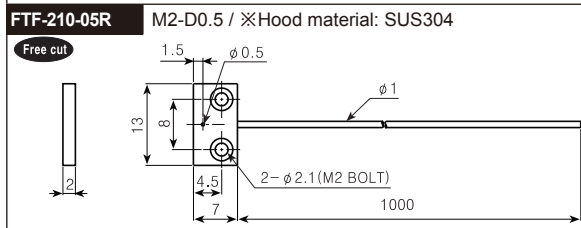
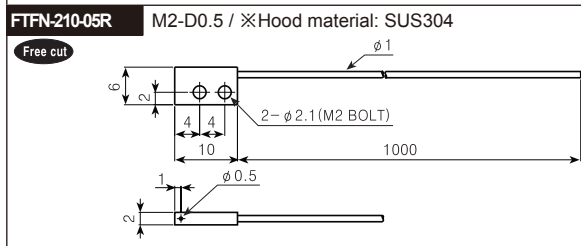
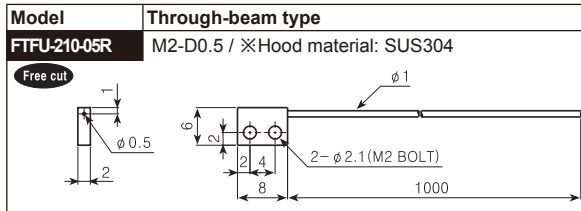
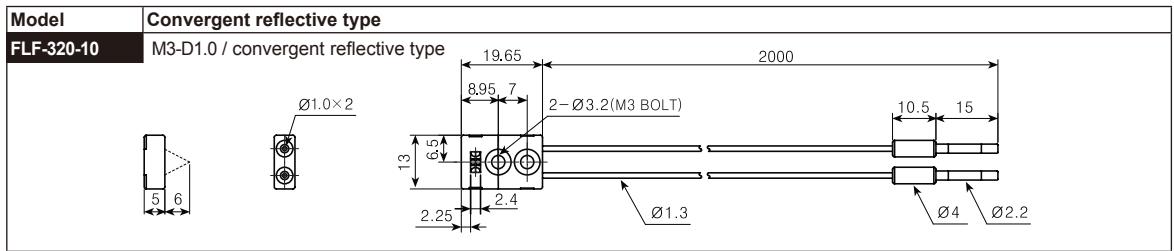
- (A) Photo electric sensor
- (B) Fiber optic sensor
- (C) Door/Area sensor
- (D) Proximity sensor
- (E) Pressure sensor
- (F) Rotary encoder
- (G) Connector/Socket
- (H) Temp. controller
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- (S) Field network device
- (T) Software
- (U) Other

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 Ø1.5×90mm |
| 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.

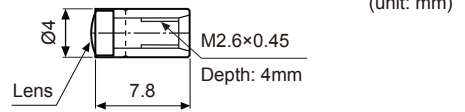
◎ Ambient temperature range of lens unit

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

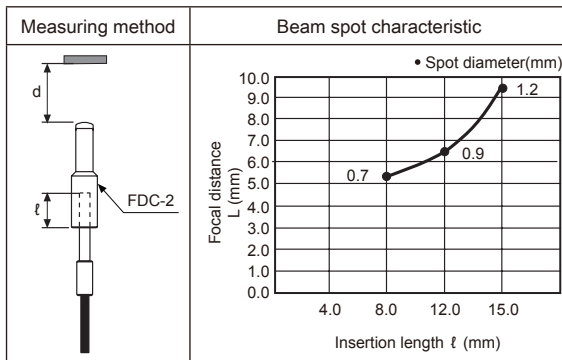


■ Micro spot fiber optic cable and lens unit(sold separately)

◎ Model

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

◎ Feature data

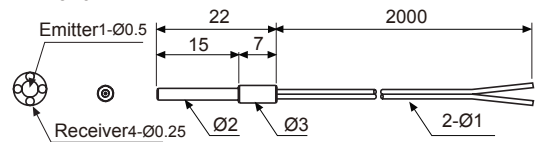


◎ Ambient temperature range of lens unit

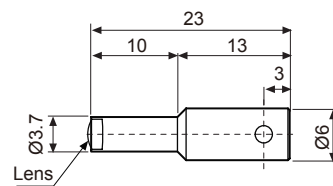
It should be used within -40 to 100°C. (not over 100°C.)

◎ 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 | |

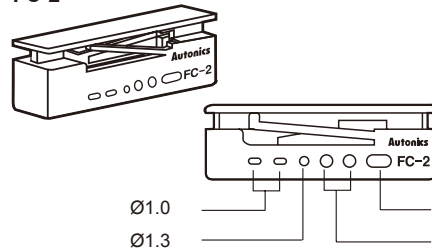
- ※500mm of protection tube can be customized.
- ※Additional 8mm is for tube coupling.

■ Accessory

◎ Fiber cutter

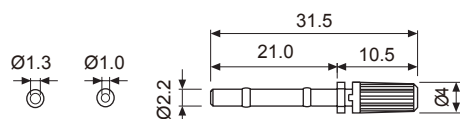
Applications: Cutting fiber optic cable, free cut type

• 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

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