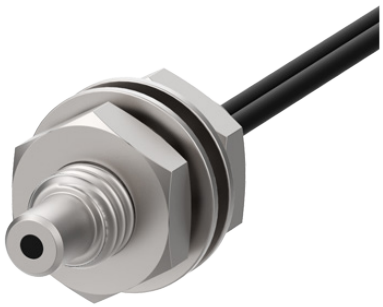
Retroreflective Type Fiber Optic Units



FD/GD Series

PRODUCT MANUAL

For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.
The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.

Icon Overview

- Std. — Standard: Fiber optic units for general purpose
- Heat-resistant: Fiber optic units for the high-temperature environment (-60 to 350°C)
- Vacuum-resistant: Fiber optic units for the high-temperature (-60 to 250°C) and vacuum environment
- Bending-resistant (R5): Fiber optic units for withstanding repeated bending
- Flexible (R1, R2): Fiber optic units for withstanding repeated flexing

Retroreflective Type Line Up

Head shape	Standard	Heat-resistance	Vacuum-resistant	Bending-resistant	Flexible
Threaded head	Std.	●	●	●	●
Cylindrical head	Std.			●	
Flat head					●
L-shaped head		●	●		
Molded plastic head	Std.				●
Perp. head		●		●	●
SUS head	Std.				
Wide area head				●	

Selection Guide

⚠ The installation method for the fiber optic units may vary depending on the fiber optic amplifiers. Be sure to refer to the 'Product manual' of the amplifiers you are using. For detailed information on the fiber optic units, refer to the 'Fiber optic sensor guide'.

00. When using the vacuum-resistant fibers
Be sure to connect with the vacuum-resistant fiber, the fiber optic coupler, and the atmospheric side fiber.

01. Model name
The model name starting with 'F' indicates plastic-type optical fibers, while starting with 'G' indicates glass-type optical fibers.

02. Minimum target size
The minimum detectable target came out with the maximum sensitivity setting of the BF4 series.

03. Sensing distance
The sensing distance of the optical fibers varies depending on the testing environments of each amplifier. Apply 10% of the BF4R□-□ sensing distance to the fiber optic amplifiers BF4G□-□ model.
Errors in the sensing distance may occur due to the sensing environment as below.
- Fiber optic units: Bend radius of cable, condition of cutting surface, amplifier insertion depth, etc.
- Detectable objects: Material, shape or inclination, bending, gloss, etc.

04. FREE CUT
Be sure to cut the cable using the provided fiber cutter (FC-3) for FREE CUT type models.

05. Adapter
Be sure to connect the provided adapter for the adapter-compatible models.
When checking the product components or ordering the sold separately, refer to the marks below.
●: It is possible to use the Product Components and the adapter (sold separately).
○: Only the adapter included with the product is available and cannot be purchased separately.
-: The adapter is not supported.

06. Dimensions
For detailed information on the drawings and dimensions, follow the Autonics website.

Product Components

- Fiber optic units
- Fiber cutter (for FREE CUT type model)
- Adapter (for Adapter-compatible model)

Sold Separately

- Included items for the vacuum-resistant fiber
  - Fiber optic coupler: FU-VC□
  - Atmospheric side fiber: FU-VA□
- Lens unit for a micro spot: FDC-2
- Fiber cutter: FC-3
- Cable protection tube: FDH-□□
- Adapter

EAC RoHS

Threaded head: Standard

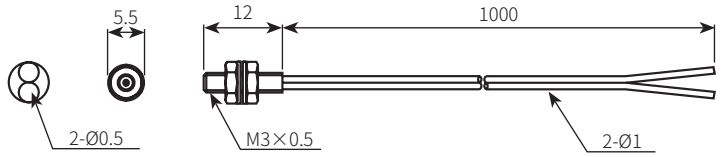
Appearance	Model	Cable		Ambient temperature	Min. target size	Sensing distance (unit: mm)					Adapter
		Length	Bend radius			Mode \ Amp.	BFX-D1-□	BF5R-□1-□	BF4R□-□ 01)	BF3RX-□ 01)	
	FD-310-05	1 m (FREE CUT)	R15	-40 to 70 °C	Ø 0.03 mm	**U-FST**	15	15	-	-	●
						FAST	20	25			
						STD	40	50			
						LONG	90	115			
						U-LG / MAX.	185	220	40	30	
	FD-320-05	2 m (FREE CUT)	R15	-40 to 70 °C	Ø 0.03 mm	**U-FST**	10	10	-	-	●
						FAST	20	15			
						STD	25	30			
						LONG	65	70			
						U-LG / MAX.	140	105	40	35	
	FD-420-05	2 m (FREE CUT)	R15	-40 to 70 °C	Ø 0.03 mm	**U-FST**	15	15	-	-	●
						FAST	20	25			
						STD	40	55			
						LONG	80	100			
						U-LG / MAX.	110	140	40	5	
	FD-620-10	2 m (FREE CUT)	R25	-40 to 70 °C	Ø 0.03 mm	**U-FST**	70	80	-	-	-
						FAST	105	120			
						STD	180	255			
						LONG	345	405			
						U-LG / MAX.	460	525	120	20	
	FD-320-F	2 m (FREE CUT)	R10	-40 to 70 °C	Ø 0.03 mm	**U-FST**	15	20	-	-	●
						FAST	20	30			
						STD	40	60			
						LONG	95	120			
						U-LG / MAX.	140	170	40	40	
	FD-320-F1	2 m (FREE CUT)	R10	-40 to 70 °C	Ø 0.03 mm	**U-FST**	20	25	-	-	●
						FAST	40	45			
						STD	60	95			
						LONG	140	175			
						U-LG / MAX.	220	250	60	20	
	FD-620-F2	2 m (FREE CUT)	R30	-40 to 70 °C	Ø 0.03 mm	**U-FST**	75	80	-	-	-
						FAST	110	140			
						STD	185	275			
						LONG	355	470			
						U-LG / MAX.	495	660	120	20	

01) When setting the maximum sensitivity for each amplifier.

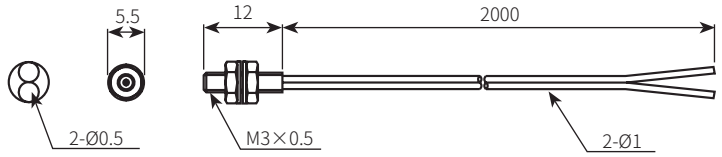
■ Dimensions

• Unit: mm, For the detailed drawings, follow the Autonics website.

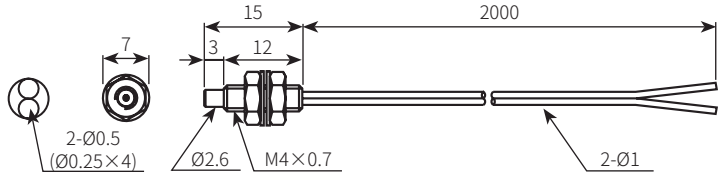
• FD-310-05



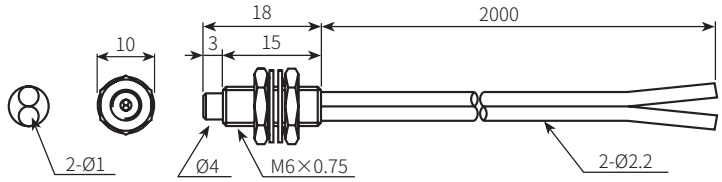
• FD-320-05



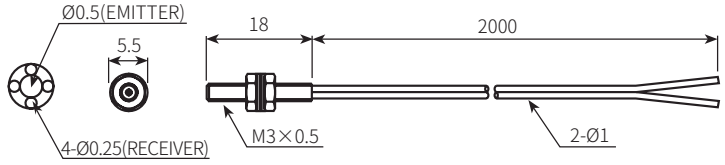
• FD-420-05



• FD-620-10

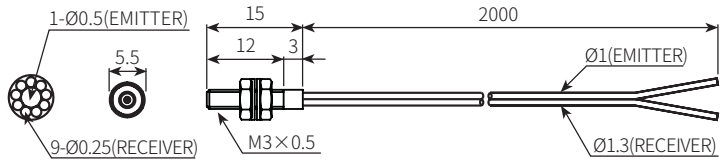


• FD-320-F

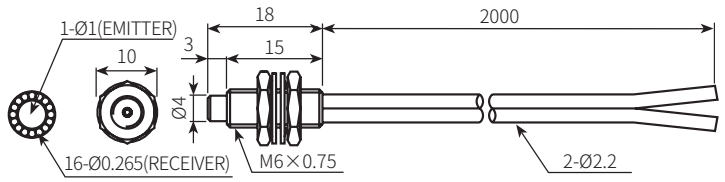


• FD-320-F1

Be sure not to change the cable of the EMITTER/RECEIVER when mounting to the amplifier.
The adapter of emitter (black), the adapter of receiver (dark gray)



• FD-620-F2



Threaded head: Heat-resistant

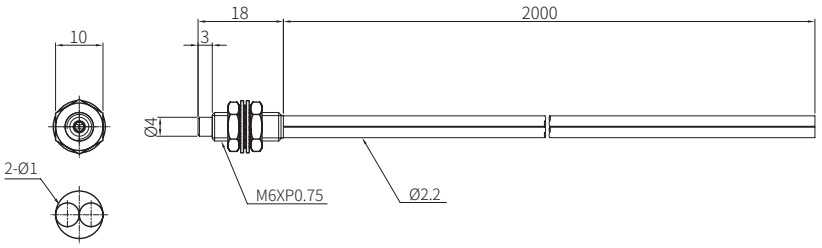
Appearance	Model	Cable		Ambient temperature	Min. target size	Sensing distance (unit: mm)					Adapter
		Length	Bend radius			Mode \ Amp.	BFX-D1-□	BF5R-□1-□	BF4R□-□ 01)	BF3RX-□ 01)	
	FD-620-10H	2 m (FREE CUT)	R25	-40 to 105 °C	Ø 0.08 mm	**U-FST**	75	80	-	-	-
						FAST	115	130			
						STD	170	300			
						LONG	300	430			
						U-LG / MAX.	520	500	200	185	
	FD-620-15H1	2 m (FREE CUT)	R35	-40 to 150 °C	Ø 0.08 mm	**U-FST**	80	85	-	-	-
						FAST	115	135			
						STD	175	275			
						LONG	340	425			
						U-LG / MAX.	440	555	165	150	
	GD-420-20H2	2 m	R25	-40 to 250 °C	Ø 0.08 mm	**U-FST**	70	95	-	-	-
						FAST	110	160			
						STD	175	330			
						LONG	325	540			
						U-LG / MAX.	495	745	180	N.A	
	GD-620-20H2	2 m	R25	-40 to 250 °C	Ø 0.08 mm	**U-FST**	75	85	-	-	-
						FAST	110	140			
						STD	175	300			
						LONG	340	470			
						U-LG / MAX.	440	620	195	N.A	
	GD-620-12H3	2 m	R25	-60 to 350 °C	Ø 0.08 mm	**U-FST**	80	90	-	-	-
						FAST	115	150			
						STD	180	270			
						LONG	320	420			
						U-LG / MAX.	450	580	190	N.A	

01) When setting the maximum sensitivity for each amplifier.

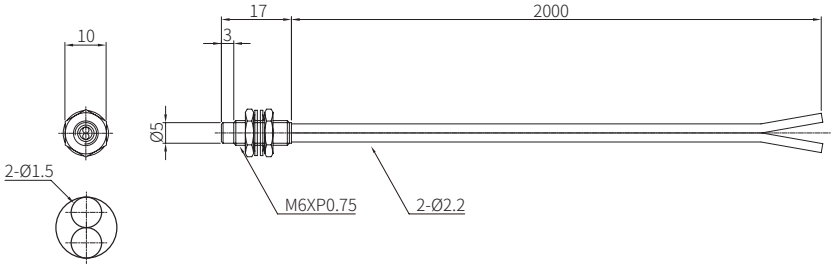
■ Dimensions

• Unit: mm, For the detailed drawings, follow the Autonics website.

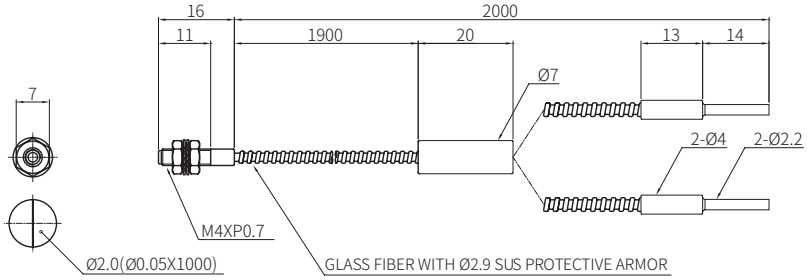
• FD-620-10H



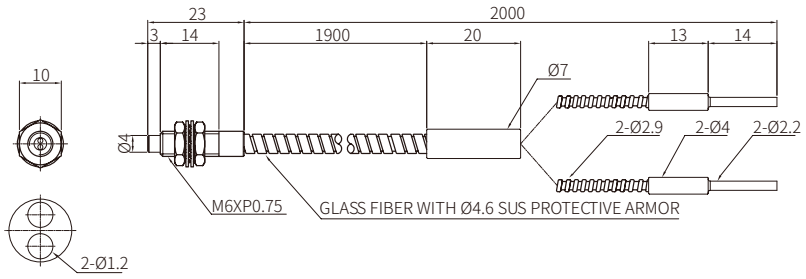
• FD-620-15H1



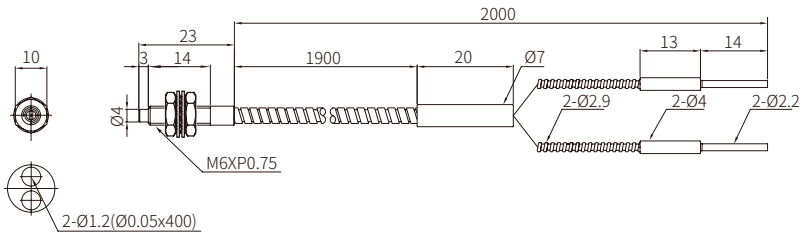
• GD-420-20H2



• GD-620-20H2



• GD-620-12H3



Threaded head: Vacuum-resistant

- Be sure to connect with the vacuum-resistant fiber, the fiber optic coupler, and the atmospheric side fiber.
- The sensing distance of the vacuum-resistant fiber unit is based on the installation of the atmospheric side fiber unit (FU-VA0□, sold separately).

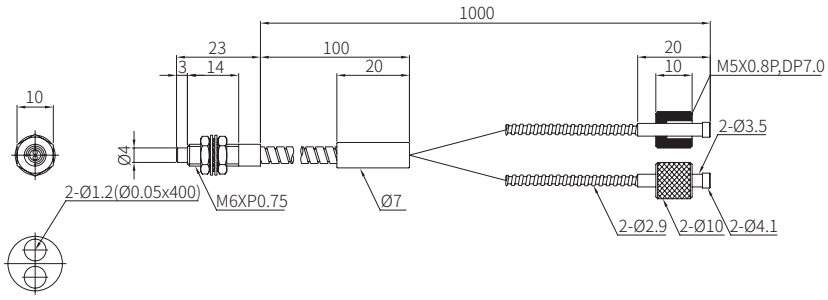
Appearance	Model	Cable		Ambient temperature	Min. target size	Sensing distance (unit: mm)					Adapter
		Length	Bend radius			Mode \ Amp.	BFX-D1-□	BF5R-□1-□	BF4R□-□ 01)	BF3RX-□ 01)	
	GD-610-12V2	1 m	R25	-60 to 250 °C	Ø 0.08 mm (+ FU-VA01)	U-FST	20	60	-	-	-
						FAST	30	90			
						STD	55	180			
						LONG	100	290			
						U-LG / MAX.	230	380	95	80	
					Ø 0.08 mm (+ FU-VA02)	U-FST	10	40	-	-	
						FAST	20	60			
						STD	35	120			
						LONG	80	230			
						U-LG / MAX.	160	310	70	60	

01) When setting the maximum sensitivity for each amplifier.

■ Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.

• GD-610-12V2



Threaded head: Bending-resistant

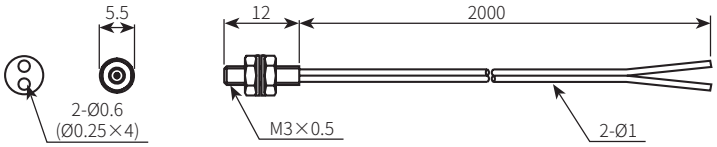
Appearance	Model	Cable		Ambient temperature	Min. target size	Sensing distance (unit: mm)					Adapter
		Length	Bend radius			Amp. / Mode	BFX-D1-□	BF5R-□1-□	BF4R□-□ 01)	BF3RX-□ 01)	
	FD-320-06B	2 m (FREE CUT)	R5	-40 to 60 °C	Ø 0.0125 mm	U-FST	15	15	-	-	●
						FAST	20	25			
						STD	35	55			
						LONG	80	100			
						U-LG / MAX.	105	145	35	35	
	FD-420-06B	2 m (FREE CUT)	R5	-40 to 60 °C	Ø 0.0125 mm	U-FST	15	15	-	-	●
						FAST	20	25			
						STD	40	60			
						LONG	85	100			
						U-LG / MAX.	115	145	35	40	
	FD-620-13B	2 m	R5	-40 to 60 °C	Ø 0.0125 mm	U-FST	40	25	-	-	-
						FAST	60	40			
						STD	105	80			
						LONG	230	315			
						U-LG / MAX.	320	410	100	15	

01) When setting the maximum sensitivity for each amplifier.

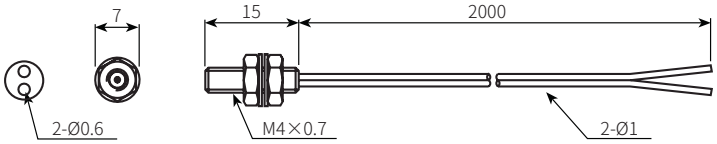
■ Dimensions

• Unit: mm, For the detailed drawings, follow the Autonics website.

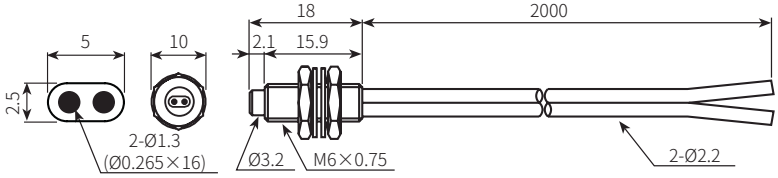
• FD-320-06B



• FD-420-06B



• FD-620-13B



Threaded head: Flexible

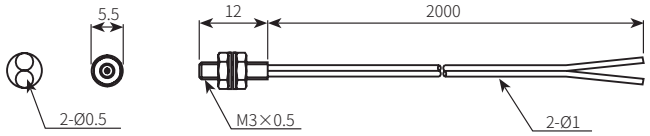
Appearance	Model	Cable		Ambient temperature	Min. target size	Sensing distance (unit: mm)					Adapter
		Length	Bend radius			Mode \ Amp.	BFX-D1-□	BF5R-□1-□	BF4R□-□ 01)	BF3RX-□ 01)	
	FD-320-05R	2 m (FREE CUT)	R1	-40 to 60 °C	Ø 0.0125 mm	U-FST	10	5	-	-	●
						FAST	15	15			
						STD	25	35			
						LONG	60	60			
						U-LG / MAX.	90	95	35	35	
	FD-420-05R	2 m (FREE CUT)	R1	-40 to 60 °C	Ø 0.0125 mm	U-FST	5	10	-	-	●
						FAST	10	20			
						STD	20	35			
						LONG	40	80			
						U-LG / MAX.	60	120	35	30	
	FD-620-10R	2 m (FREE CUT)	R1	-40 to 60 °C	Ø 0.04 mm	U-FST	45	55	-	-	-
						FAST	70	85			
						STD	120	130			
						LONG	275	335			
						U-LG / MAX.	420	480	130	15	

01) When setting the maximum sensitivity for each amplifier.

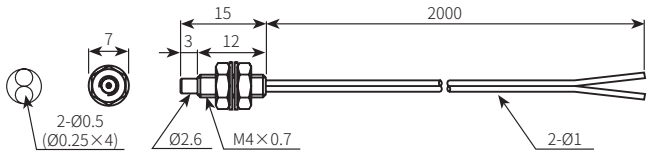
■ Dimensions

• Unit: mm, For the detailed drawings, follow the Autonics website.

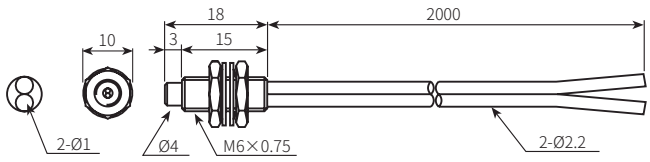
• FD-320-05R



• FD-420-05R



• FD-620-10R



Cylindrical head: Standard

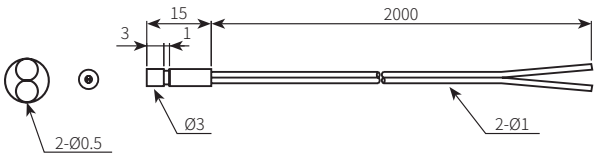
Appearance	Model	Cable		Ambient temperature	Min. target size	Sensing distance (unit: mm)					Adapter
		Length	Bend radius			Mode \ Amp.r	BFX-D1-□	BF5R-□1-□	BF4R□-□ 02)	BF3RX-□ 02)	
	FDC-320-05	2 m (FREE CUT)	R15	-40 to 70 °C	Ø 0.03 mm	U-FST	15	15	-	-	●
						FAST	20	20			
						STD	40	50			
						LONG	80	85			
						U-LG / MAX.	120	140	40	35	
	FDC-320-F 01)	2 m (FREE CUT)	R10	-40 to 70 °C	Ø 0.03 mm	U-FST	15	15	-	-	●
						FAST	20	25			
						STD	35	55			
						LONG	80	110			
						U-LG / MAX.	120	160	40	5	

01) The micro-spot lens unit (FDC-2, sold separately) can be equipped with this fiber.
02) When setting the maximum sensitivity for each amplifier.

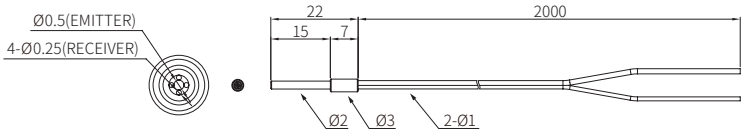
■ Dimensions

• Unit: mm, For the detailed drawings, follow the Autonics website.

• FDC-320-05



• FDC-320-F



Cylindrical head: Bending-resistant

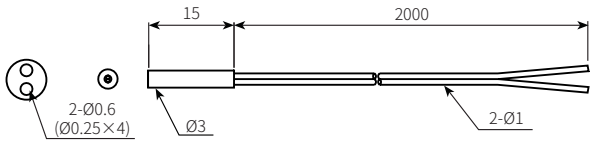
Appearance	Model	Cable		Ambient temperature	Min. target size	Sensing distance (unit: mm)					Adapter
		Length	Bend radius			Mode \ Amp.	BFX-D1-□	BF5R-□1-□	BF4R□-□ 01)	BF3RX-□ 01)	
	FDC-320-06B	2 m (FREE CUT)	R5	-40 to 60 °C	Ø 0.0125 mm	U-FST	15	10	-	-	●
						FAST	20	20			
						STD	40	50			
						LONG	85	85			
						U-LG / MAX.	120	115	35	5	

01) When setting the maximum sensitivity for each amplifier.

■ Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.

• FDC-320-06B



Flat head: Flexible

Appearance	Model	Cable		Ambient temperature	Min. target size	Sensing distance (unit: mm)					Adapter
		Length	Bend radius			Amp. / Mode	BFX-D1-□	BF5R-□1-□	BF4R□-□ 01)	BF3RX-□ 01)	
	FDF-210-05R	1 m (FREE CUT)	R1	-40 to 60 °C	Ø 0.0125 mm	U-FST	10	10	-	-	●
						FAST	15	20			
						STD	25	30			
						LONG	55	60			
						U-LG / MAX.	60	95	20	10	
	FDFN-210-05R	1 m (FREE CUT)	R1	-40 to 60 °C	Ø 0.0125 mm	U-FST	5	10	-	-	●
						FAST	10	15			
						STD	25	30			
						LONG	65	70			
						U-LG / MAX.	100	105	20	15	
	FDFU-210-05R	1 m (FREE CUT)	R1	-40 to 60 °C	Ø 0.0125 mm	U-FST	10	5	-	-	●
						FAST	15	15			
						STD	25	35			
						LONG	65	90			
						U-LG / MAX.	105	130	35	10	

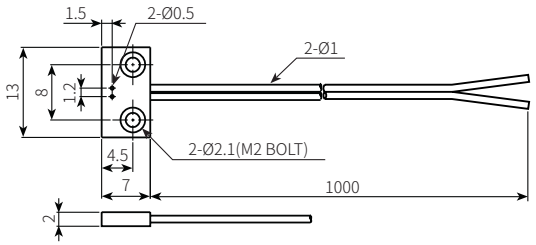
01) When setting the maximum sensitivity for each amplifier.

■ Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.

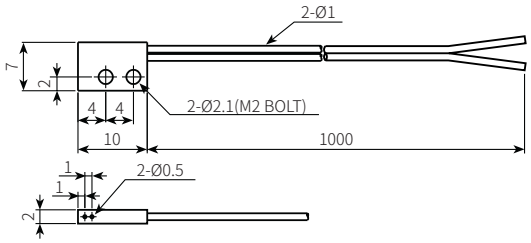
• FDF-210-05R

Hood material: SUS303, flat view



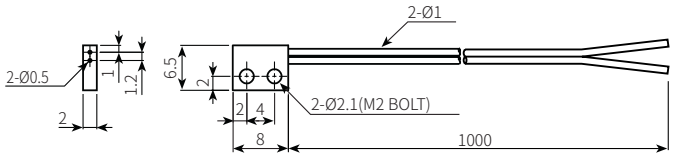
• FDFN-210-05R

Hood material: SUS303, side view



• FDFU-210-05R

Hood material: SUS303, top view



L-shaped head: Heat-resistant

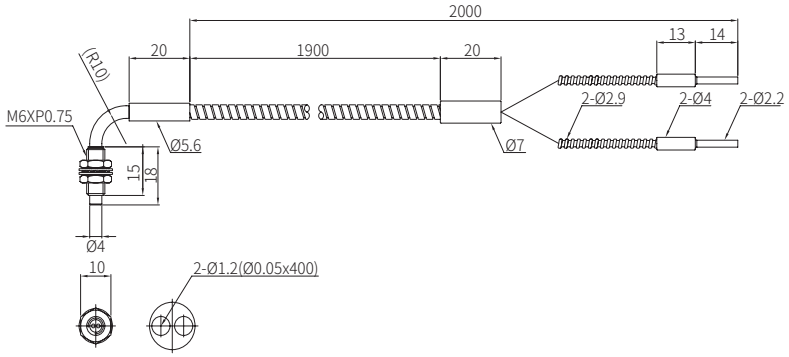
Appearance	Model	Cable		Ambient temperature	Min. target size	Sensing distance (unit: mm)					Adapter
		Length	Bend radius			Mode \ Amp.	BFX-D1-□	BF5R-□1-□	BF4R□-□ 01)	BF3RX-□ 01)	
	GDL-620-12H2	2 m	R25	-60 to 250 °C	Ø 0.08 mm	U-FST	80	80	-	-	-
						FAST	125	130			
						STD	200	260			
						LONG	355	430			
						U-LG / MAX.	545	590	200	N.A	
	GDL-620-12H3	2 m	R25	-60 to 350 °C	Ø 0.08 mm	U-FST	75	80	-	-	-
						FAST	110	140			
						STD	160	260			
						LONG	300	410			
						U-LG / MAX.	460	550	175	N.A	

01) When setting the maximum sensitivity for each amplifier.

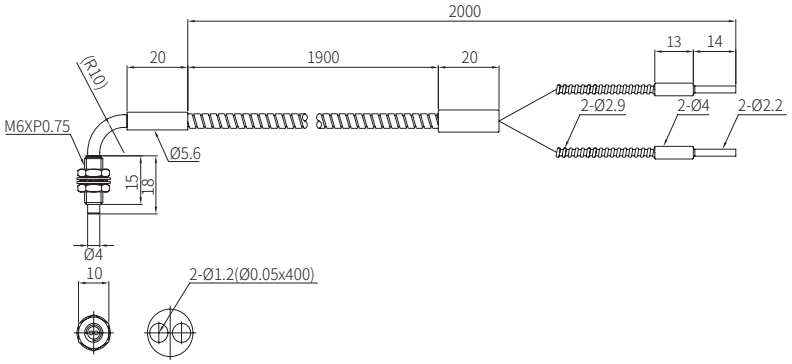
■ Dimensions

• Unit: mm, For the detailed drawings, follow the Autonics website.

• GDL-620-12H2



• GDL-620-12H3



L-shaped head: Vacuum-resistant

- Be sure to connect with the vacuum-resistant fiber, the fiber optic coupler, and the atmospheric side fiber.
- The sensing distance of the vacuum-resistant fiber unit is based on the installation of the atmospheric side fiber unit (FU-VA0□, sold separately).

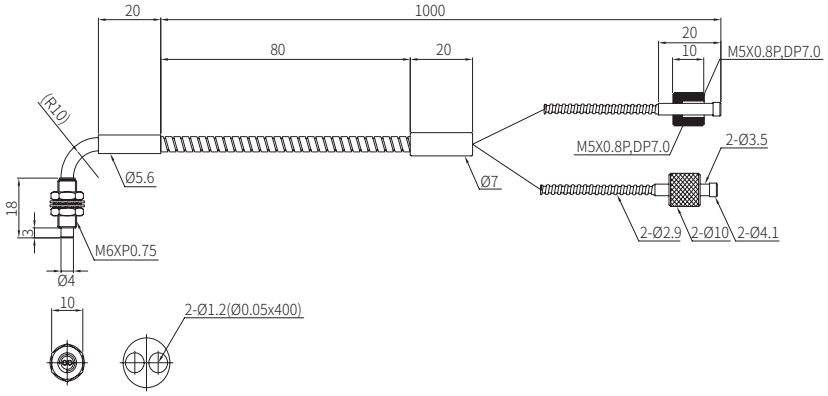
Appearance	Model	Cable		Ambient temperature	Min. target size	Sensing distance (unit: mm)					Adapter
		Length	Bend radius			Amp. / Mode	BFX-D1-□	BF5R-□1-□	BF4R□-□ 01)	BF3RX-□ 01)	
	GDL-610-12V2	1 m	R25	-60 to 250 °C	Ø 0.08 mm (+ FU-VA01)	U-FST	40	60	-	-	-
						FAST	55	90			
						STD	90	180			
						LONG	185	300			
						U-LG / MAX.	255	380	80	80	
					Ø 0.08 mm (+ FU-VA02)	U-FST	20	40	-	-	
						FAST	35	60			
						STD	60	130			
						LONG	130	230			
						U-LG / MAX.	185	320	55	60	

01) When setting the maximum sensitivity for each amplifier.

■ Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.

• GDL-610-12V2



Molded plastic head: Standard

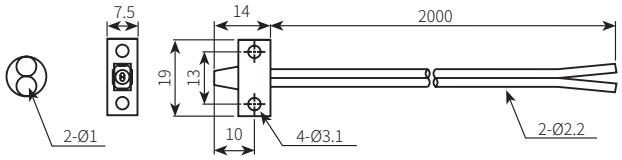
Appearance	Model	Cable		Ambient temperature	Min. target size	Sensing distance (unit: mm)					Adapter
		Length	Bend radius			Mode \ Amp.	BFX-D1-□	BF5R-□1-□	BF4R□-□ 01)	BF3RX-□ 01)	
	FDP-320-10	2 m (FREE CUT)	R25	-40 to 70 °C	Ø 0.03 mm	U-FST	55	65	-	-	-
						FAST	75	100			
						STD	110	160			
						LONG	175	230			
						U-LG / MAX.	200	280	120	15	

01) When setting the maximum sensitivity for each amplifier.

■ Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.

• FDP-320-10



Molded plastic head: Flexible

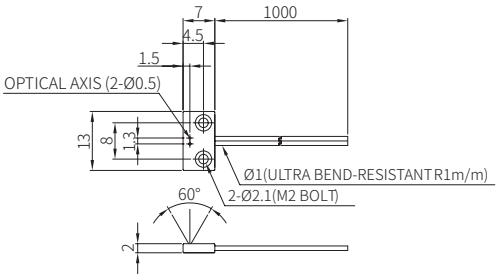
Appearance	Model	Cable		Ambient temperature	Min. target size	Sensing distance (unit: mm)				Adapter
		Length	Bend radius			Amp. / Mode	BFX-D1-□	BF5R-□1-□	BF4R□-□ 01)	BF3RX-□ 01)	
	FDPF-210-05R	1 m (FREE CUT)	R1	-30 to 70 °C	Ø 0.08 mm	U-FST	10	20	-	-	●
						FAST	20	30			
						STD	35	70			
						LONG	80	140			
						U-LG / MAX.	115	210	25	30	

01) When setting the maximum sensitivity for each amplifier.

■ Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.

• FDPF-210-05R



Perpendicular head: Heat-resistant

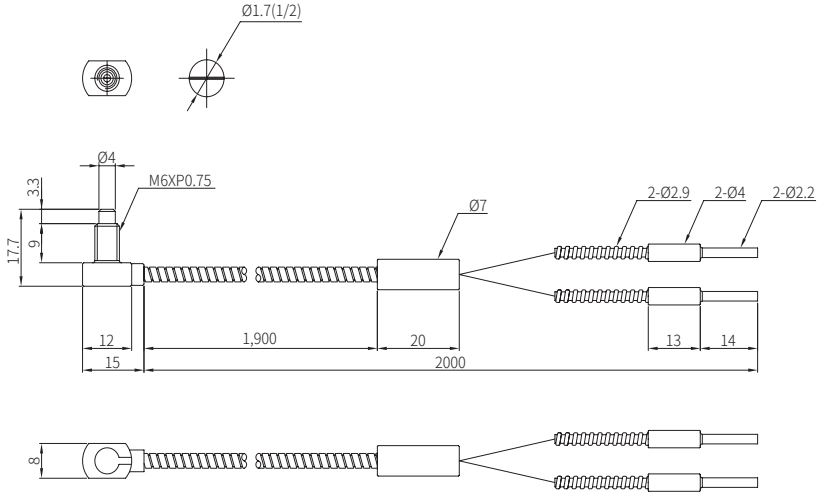
Appearance	Model	Cable		Ambient temperature	Min. target size	Sensing distance (unit: mm)					Adapter
		Length	Bend radius			Mode \ Amp.	BFX-D1-□	BF5R-□1-□	BF4R□-□ 01)	BF3RX-□ 01)	
	GDR-620-17H2	2 m	R25	-60 to 250 °C	Ø 0.08 mm	U-FST	80	80	-	-	-
						FAST	120	140			
						STD	200	250			
						LONG	320	410			
						U-LG / MAX.	405	540	310	N.A	
	GDR-620-17H3	2 m	R25	-60 to 350 °C	Ø 0.08 mm	U-FST	65	80	-	-	-
						FAST	110	140			
						STD	165	260			
						LONG	335	410			
						U-LG / MAX.	560	560	185	N.A	

01) When setting the maximum sensitivity for each amplifier.

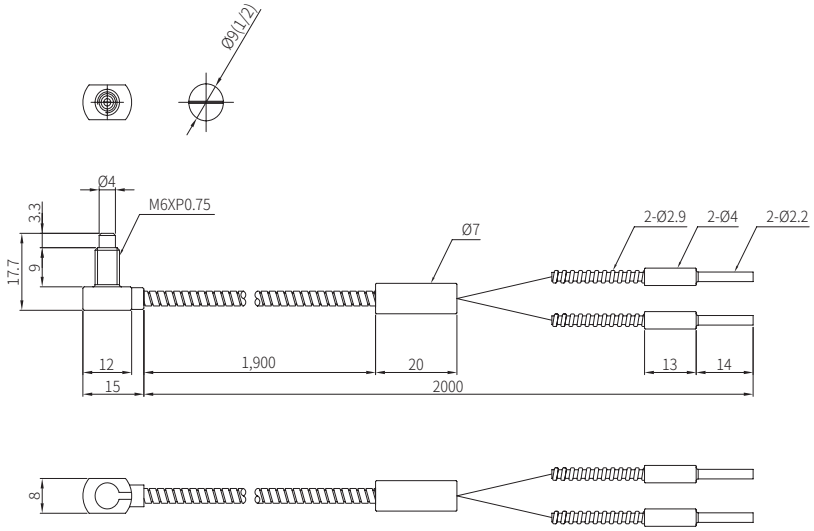
■ Dimensions

• Unit: mm, For the detailed drawings, follow the Autonics website.

• GDR-620-17H2



• GDR-620-17H3



Perpendicular head: Bending-resistant

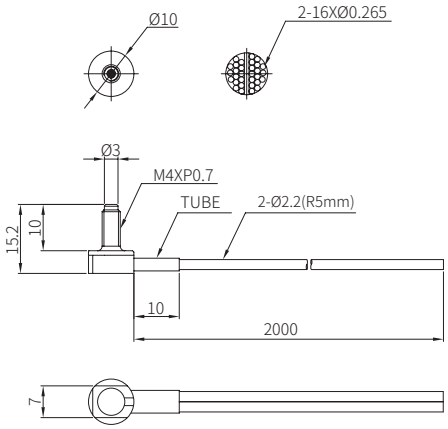
Appearance	Model	Cable		Ambient temperature	Min. target size	Sensing distance (unit: mm)				Adapter
		Length	Bend radius			Mode \ Amp.	BFX-D1-□	BF5R-□1-□	BF4R□-□ 01)	BF3RX-□ 01)	
	FDRT-420-02B	2 m (FREE CUT)	R5	-30 to 70 °C	Ø 0.08 mm	U-FST	50	70	-	-	-
						FAST	70	110			
						STD	125	230			
						LONG	250	390			
						U-LG / MAX.	440	540	80	120	

01) When setting the maximum sensitivity for each amplifier.

■ Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.

• FDRT-420-02B



Perpendicular head: Flexible

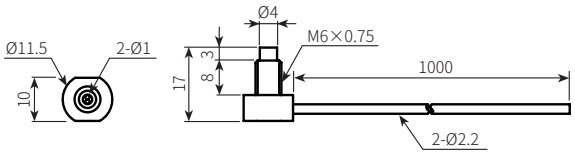
Appearance	Model	Cable		Ambient temperature	Min. target size	Sensing distance (unit: mm)					Adapter
		Length	Bend radius			Mode \ Amp.	BFX-D1-□	BF5R-□1-□	BF4R□-□ 01)	BF3RX-□ 01)	
	FDR-610-10R	1 m (FREE CUT)	R1	-40 to 60 °C	Ø 0.04 mm	U-FST	40	45	-	-	-
						FAST	60	85			
						STD	110	120			
						LONG	265	345			
						U-LG / MAX.	440	485	160	5	

01) When setting the maximum sensitivity for each amplifier.

■ Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.

- **FDR-610-10R**
  Hood material: SUS303



SUS head: Standard

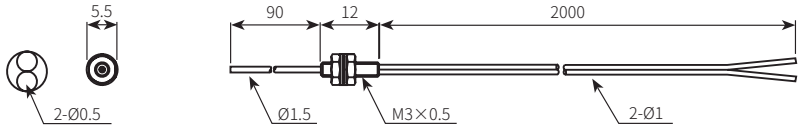
Appearance	Model	Cable		Ambient temperature	Min. target size	Sensing distance (unit: mm)				Adapter
		Length	Bend radius			Amp. / Mode	BFX-D1-□	BF5R-□1-□	BF4R□-□ [01]	BF3RX-□ [01]	
	FDS-320-05	2 m (FREE CUT)	R15 (SUS part R10)	-40 to 70 °C	Ø 0.03 mm	**U-FST**	15	15	-	-	-
						FAST	25	30			
						STD	45	70			
						LONG	100	120			
						U-LG / MAX.	180	240	40	5	
	FDS-420-05	2 m (FREE CUT)	R15 (SUS part R10)	-40 to 70 °C	Ø 0.03 mm	**U-FST**	20	15	-	-	●
						FAST	30	25			
						STD	50	65			
						LONG	135	120			
						U-LG / MAX.	180	180	40	5	
	FDS-620-10	2 m (FREE CUT)	R25 (SUS part R10)	-40 to 70 °C	Ø 0.03 mm	**U-FST**	70	75	-	-	--
						FAST	110	135			
						STD	180	265			
						LONG	315	435			
						U-LG / MAX.	580	655	120	5	
	FDS2-320-05	2 m (FREE CUT)	R15 (SUS part R10)	-40 to 70 °C	Ø 0.03 mm	**U-FST**	15	15	-	-	●
						FAST	20	25			
						STD	40	60			
						LONG	95	135			
						U-LG / MAX.	175	230	40	5	
	FDS2-420-05	2 m (FREE CUT)	R15 (SUS part R10)	-40 to 70 °C	Ø 0.03 mm	**U-FST**	20	20	-	-	●
						FAST	30	30			
						STD	55	70			
						LONG	135	125			
						U-LG / MAX.	240	200	40	10	
	FDS2-620-10	2 m (FREE CUT)	R25 (SUS part R10)	-40 to 70 °C	Ø 0.03 mm	**U-FST**	65	80	-	-	--
						FAST	100	130			
						STD	160	245			
						LONG	320	455			
						U-LG / MAX.	680	565	120	5	
	FDCS-320-05	2 m (FREE CUT)	R15 (SUS part R10)	-40 to 70 °C	Ø 0.03 mm	**U-FST**	10	2	-	-	●
						FAST	20	3			
						STD	40	8			
						LONG	100	15			
						U-LG / MAX.	175	20	40	5	
	FDCSN-320-05	2 m	R15	-40 to 60 °C	Ø 0.0125 mm	**U-FST**	6	5	-	-	○ [02]
						FAST	8	15			
						STD	10	30			
						LONG	35	50			
						U-LG / MAX.	70	100	15	5	

01) When setting the maximum sensitivity for each amplifier.
02) The adapter for this model is not compatible with the separately sold adapter and cannot be purchased separately, so be careful not to lose it.

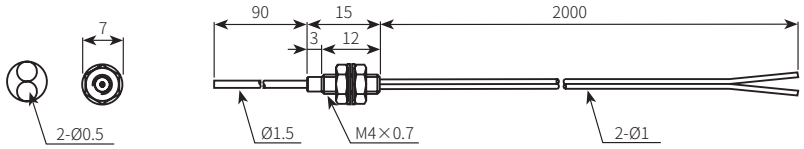
■ Dimensions

• Unit: mm, For the detailed drawings, follow the Autonics website.

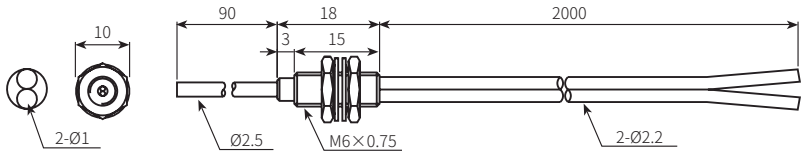
• FDS-320-05



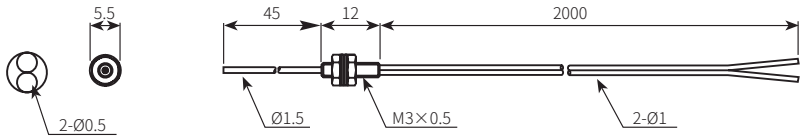
• FDS-420-05



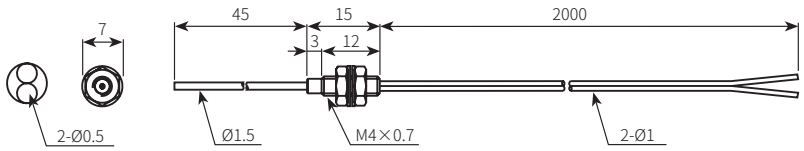
• FDS-620-10



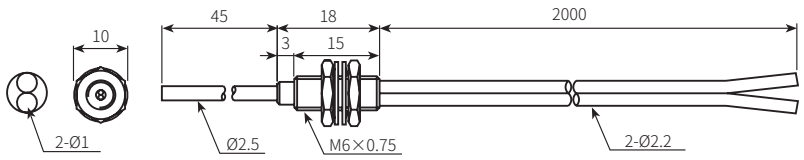
• FDS2-320-05



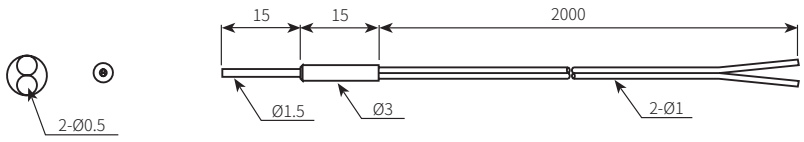
• FDS2-420-05



• FDS2-620-10

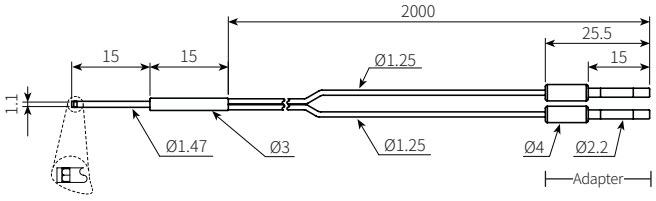


• FDCS-320-05



• FDCSN-320-05

Side view



Wide area head: Bending-resistant

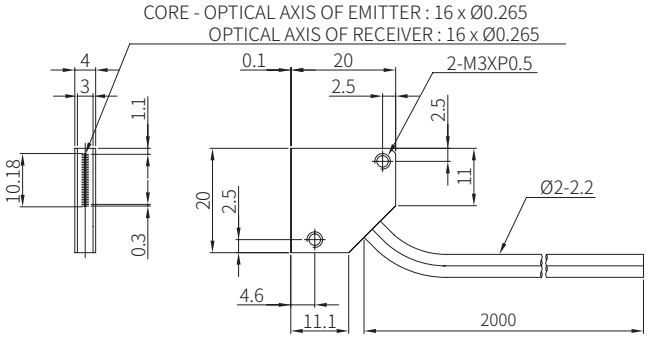
Appearance	Model	Cable		Ambient temperature	Min. target size	Sensing distance (unit: mm)					Adapter
		Length	Bend radius			Amp. / Mode	BFX-D1-□	BF5R-□1-□	BF4R□-□ 01)	BF3RX-□ 01)	
	FDW10-320-02B	2 m (FREE CUT)	R5	-30 to 70 °C	Ø 0.08 mm	**U-FST**	40	75	-	-	-
						FAST	60	120			
						STD	100	230			
						LONG	240	390			
						U-LG / MAX.	385	510	150	80	
	FDW10T-320-02B	2 m (FREE CUT)	R5	-30 to 70 °C	Ø 0.08 mm	**U-FST**	45	75	-	-	-
						FAST	70	120			
						STD	120	230			
						LONG	275	390			
						U-LG / MAX.	485	510	175	60	

01) When setting the maximum sensitivity for each amplifier.

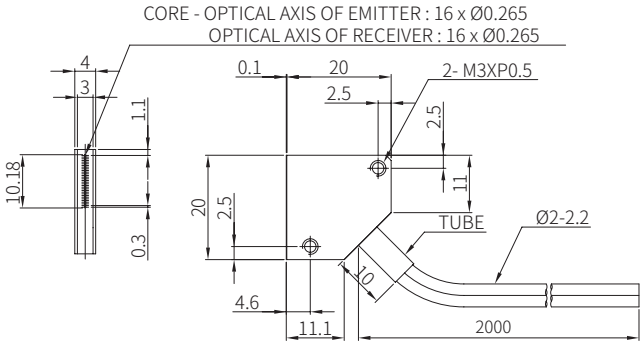
■ Dimensions

• Unit: mm, For the detailed drawings, follow the Autonics website.

• FDW10-320-02B



• FDW10T-320-02B



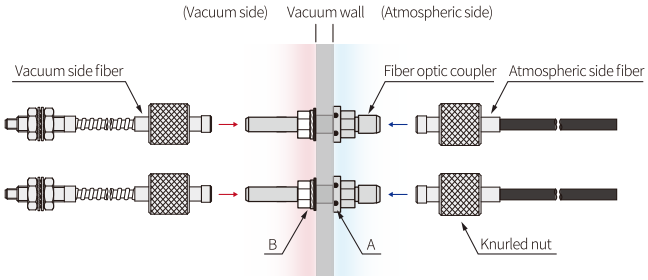
Sold Separately: Fiber Optic Coupler, Atmospheric side fiber

■ Cautions during installation

- When using the vacuum-resistant fibers, be sure to connect with the fiber optic coupler and the atmospheric side fibers.
- The fiber optic coupler is a device that seals the vacuum side and the atmospheric side to transmit light, and it is equipped with an O-ring. Be sure not to blur the glass rod inside by welding on the vacuum wall and weld joints.
- When installing the fiber optic coupler, following the environmental requirements below.
  - Thickness of the installation wall: 8 to 10 mm
  - Diameter of the mounting hole: Ø 5.0 + 0.1, - 0.1 mm
  - Surface roughness in contact with the O-ring: 1.6 Ry
- Be sure to install the fiber optic coupler and fiber optic units by checking the specified connection points below. Failure to follow this instruction may result in product damage.
  - Vacuum side fibers → Long side of the fiber optic coupler
  - Atmospheric side fibers → Short side of the fiber optic coupler

■ Example of usage

01. Insert the fiber optic coupler into the mounting hole of the vacuum wall.
02. From the long side of the fiber optic coupler, insert a flat washer, followed by a spring washer, and then a nut to the direction of the vacuum wall. Tighten the nut to secure the fiber optic coupler.
03. Turn the knurled nuts of the vacuum side and atmospheric side fibers to connect them with the fiber optic coupler.



A. O-ring
B. An M5 nut + a spring washer+ a flat washer

■ Fiber optic coupler

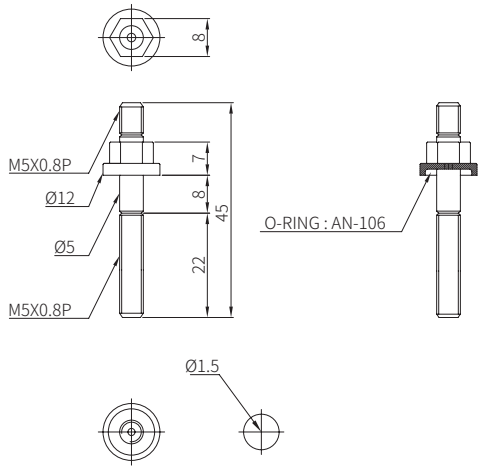
Appearance	Ambient temperature	Applicable cable	Model
	-60 to 200 °C	Vacuum-resistant type, Atmospheric side type	FU-VC01
	-60 to 300 °C	Vacuum-resistant type, Atmospheric side type	FU-VC02

- Helium leak testing: ≤ 10^{-11} Pa · m³/s
- Product components: Fiber optic coupler, M5 nut, spring washer, flat washer (each × 2)

■ Dimensions

Unit: mm, For the detailed drawing, follow the Autonics website.

• FU-VC01, FU-VC02



■ Atmospheric side fiber

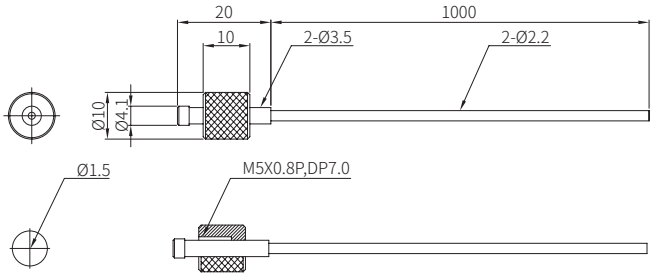
Appearance	Bend radius	Ambient temperature	FREE CUT	Model
	R30	-30 to 70 °C	FREE CUT	FU-VA01
	R20	-30 to 70 °C	FREE CUT	FU-VA02

- Product components: Atmospheric side fiber × 2, Fiber cutter (FC-3) × 1

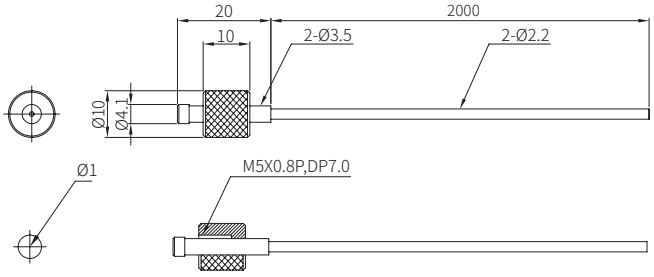
■ Dimensions

Unit: mm, For the detailed drawing, follow the Autonics website.

• FU-VA01

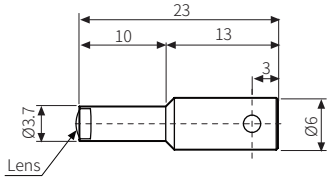


• FU-VA02

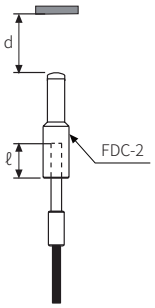
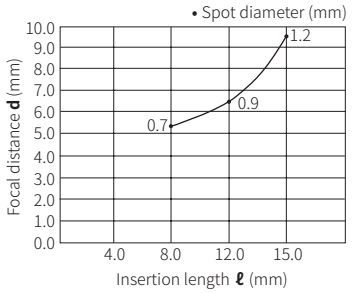


Sold Separately: Micro-Spot Lens Unit

The lens unit can be used when detecting small objects.
• Supported fiber optic unit: FDC-320-F

Model	Ambient temperature	Dimensions (unit: mm)
FDC-2	-40 to 100 °C	

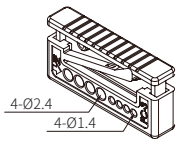
■ Characteristic curve

Measuring method	Beam spot characteristic
	

■ Sensing distance

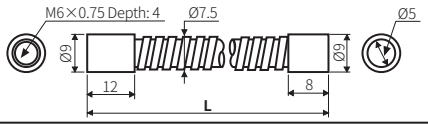
Lens insertion length (ℓ)	Sensing distance (unit: mm)				
	Amp. / Mode	BFX-D1-□	BF5R-□1-□	BF4R□-□	BF3RX-□
8 mm	U-FST	6	6	-	-
	FAST	8	9		
	STD	12	15		
	LONG	25	30		
	U-LG / MAX.	55	50	N.A	N.A
12 mm	U-FST	5	5	-	-
	FAST	10	10		
	STD	15	20		
	LONG	35	35		
	U-LG / MAX.	75	80	N.A	N.A
15 mm	U-FST	15	20	-	-
	FAST	20	25		
	STD	35	45		
	LONG	70	85		
	U-LG / MAX.	140	135	N.A	N.A

Sold Separately: Fiber Cutter

Model	Hole diameter	Appearance
FC-3	Ø2.4 X 4 Ø1.4 X 4	

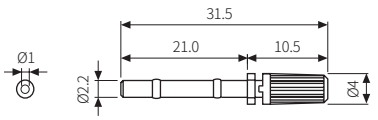
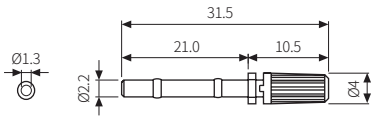
Sold Separately: Cable Protection Tube

Be sure to consider the diameter of the fiber optic cable and choose a suitable protection tube for the fiber cable.
• Diameter of cable: Cable protection tube > Fiber optic unit

Model	Length (L)	Dimensions (unit: mm)
FDH-605	500 mm	
FDH-610	1,000 mm	

Sold Separately: Adapter

The additional adapter for the Adapter-compatible models can be purchased through an authorized distributor of Autonics.

Model	Feature	Dimensions (unit: mm)
B1700000047	Inner diameter: Ø1 Color: black	
B1700000046	Inner diameter:Ø1.3 Color: dark gray	

Ordering Information

This is only for reference, the actual product does not support all combinations. For selecting the specified model, follow the Autonics website.

• Example of ordering information: FD-620-10H

F	D	□	-	6	20	-	10	H	□
❶	❷	❸	-	❹	❺	-	❻	❼	❽

❶	**Fiber material**	F	Plastic
		G	Glass
❷	**Sensing type**	D	Retroreflective type
		L	Convergent reflective type
		T	Through-beam type
❸	**Head shape**		
	· Threaded head	No mark	Standard
	· Cylindrical head	C	Standard
		CS	Cylinder+SUS head (SUS length 15 mm)
		CSN	Cylinder+SUS head (SUS length 15 mm, side view)
	· Flat head	F	Flat view
		FB	Side view+Top view (bending)
		FN	Side view
		FU	Top view (up)
		LU	L-shaped head top view (height 12.2 mm)
		LU1	L-shaped head top view (height 17.2 mm)
		LU2	L-shaped head top view (height 22.2 mm)
	· L-shaped head	L	Standard
	· Molded plastic head	P	Standard
		PF	Flat view
	· Perpendicular head	R	Standard
		RT	Protection tube mounted
	· SUS head	S	SUS length 90 mm
		S1	SUS length 35 mm
		S2	SUS length 45 mm
	· U-shaped head	U3	Beam width 3 mm
	· Wide area head	W5	Beam width 5 mm
		W10	Beam width 10 mm
		W10T	Beam width 10 mm, protection tube mounted
		W11	Beam width 11 mm
	· Protection tube	H	Protection tube for fiber cable (sold separately)
❹	**Hood diameter**	15	Ø 1.5 mm
		2	Ø 2 mm (M2)
		3	Ø 3 mm (M3)
		4	Ø 4 mm (M4)
		6	Ø 6 mm (M6)

❺	**Cable length**	5	0.5 m
		10	1 m
		20	2 m
		10M	10 m
❻	**Fiber diameter**	2	Ø 0.2 mm
		5	Ø 0.5 mm
		6	Ø 0.6 mm
		10	Ø 1.0 mm
		12	Ø 1.2 mm
		13	Ø 1.3 mm
		14	Ø 1.4 mm
		15	Ø 1.5 mm
		17	Ø 1.7 mm
		20	Ø 2.0 mm
		F	Ø 0.5 mm, Ø 0.25 mm×4 (coaxial type)
		F1	Ø 0.5 mm, Ø 0.25 mm×9 (coaxial type)
		F2	Ø 1.0 mm, Ø 0.265 mm×16 (coaxial type)
❼	**Unit type**	No mark	Standard
		B	Bending-resistant (R5)
		R	Flexible (R1, R2)
		H	Heat-resistant (-40 to 105 °C)
		H1	Heat-resistant (-40 to 150 °C)
		H2	Heat-resistant (-60 to 250 °C)
		H3	Heat-resistant (-60 to 350 °C)
		V	Vacuum-resistant (-60 to 100 °C)
		V1	Vacuum-resistant (-60 to 150 °C)
		V2	Vacuum-resistant (-60 to 250 °C)
		V3	Vacuum-resistant (-60 to 350 °C)
❽	**Convergent reflective type size option**	A	R20 / 12×18×3
		L	Over 30 mm of the product length
	Waterproof sealing	WP	Water resistance supported