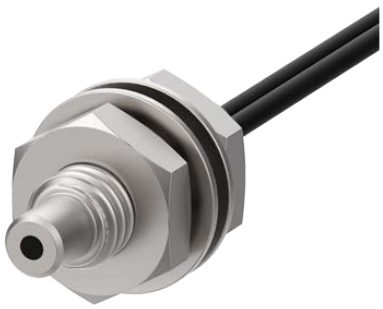


Diffuse Reflective Type Fiber Optic Units

FD/GD Series

PRODUCT MANUAL

Be sure to follow the instructions and precautions in the instruction manual, other manuals, and the Autonics website.
The specifications, dimensions, and other information in this document are subject to change without notice for product improvement. Certain models may be discontinued without notice.

Diffuse Reflective Type Lineup

Head Type	Standard	Heat-Resistant	Vacuum-Resistant	Bend-Resistant	Flexible
Threaded	✓	✓	✓	✓	✓
Cylindrical	✓			✓	✓
Flat					✓
L-Type		✓	✓		
Molded Plastic	✓				✓
Perpendicular		✓		✓	✓
Stainless Steel	✓				
Wide Area				✓	

Standard Type	For use in standard environmental conditions
Heat-Resistant Type	For use in high temperatures (-60 to 350 °C)
Vacuum-Resistant Type	For use in vacuum or high temperatures (-60 to 350 °C)
Bend-Resistant Type	(R5) For use in enviroments requiring frequent bends
Flexible Type	(R1, R2) For use in enviroments requiring frequent bends

Product Components

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

Sold Separately

- For vacuum-resistant type fiber units
  - Fiber optic coupler: FU-VC☐
  - Atmospheric fiber optic unit: FU-VA☐
- Lens unit for micro spot: FDC-2
- Cable cutter: FC-3
- Cable protection tube: FDH-☐☐
- Adapter

RoHS

Ordering Information

For reference only. The actual product does not support all combinations. To check all supported models, please refer to the Autonics website.

- Reference model example: 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	Diffuse reflective
		L	Convergent reflective
		T	Through-beam
❸	**Head type**		
	· Threaded	No mark	Standard
	· Cylindrical	C	Standard
		CN	Side view
		CS	Cylindrical + stainless steel (stainless steel length 15 mm)
		CSN	Cylindrical + stainless steel (stainless steel length 15 mm, side view)
	· Flat	F	Flat view
		FB	Side view + top view (bending)
		FN	Side view
		FU	Top view (up)
		LU	L-type top view (height 12.2 mm)
		LU1	L-type top view (height 17.2 mm)
		LU2	L-type top view (height 22.2 mm)
	· L-type	L	Standard
	· Molded plastic	P	Standard
		PF	Flat view
	· Perpendicular	R	Standard
		RT	Mounted protection tube
	· Stainless steel	S	Stainless steel length 90 mm
		S1	Stainless steel length 35 mm
		S2	Stainless steel length 45 mm
	· U-shaped	U6	Sensing distance 6 mm
		U10	Sensing distance 10 mm
		U20	Sensing distance 20 mm
	· Wide area	W5	Beam width 5 mm
		W10	Beam width 10 mm
		W10T	Beam width 10 mm, mounted protection tube
		W11	Beam width 11 mm
		W20	Beam width 20 mm
		W40	Beam width 40 mm
		W60	Beam width 60 mm
		W100	Beam width 100 mm
	· Protection tube	H	Fiber cable protection tube (sold spearately)
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	**Cable type**	No mark	Standard
		B	Bend-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	**Misc.**	A	R20 / 12×18×3
		L	Product length: ≥ 30 mm
		LN	Built-in lens
		WP	Water-resistant [01]
		WF	Waterproof [01]

01) The waterproof performance is intended to prevent product damage and safety issues caused by external moisture ingress and does not guarantee maintenance of detection performance.
Due to the characteristics of optical sensors, in mist or condensation environments, moisture on the lens surface may cause refraction and scattering of light, resulting in fluctuations in the PV value.
- Water-resistant: Waterproof sealing structure applied to major joints.
- Waterproof: Integrated sealing structure applied using an external protective tube.

Selection Guide

⚠ The installation method of the fiber optic unit may vary depending on the fiber optic amplifier. Be sure to refer to the product manual of the fiber optic amplifier. For details on fiber optic units, refer to 'Fiber Optic Sensor Technical Overview.'

■ Model

- Refer to the Ordering Information for fiber material, sensing type, head type, hood diameter, cable length, fiber diameter, cable type, and other specifications.

■ Cable

- Check the length, bend radius, and FREE CUT compatibility of the cable.
- Use the included cable cutter (FC-3) when cutting FREE CUT compatible models.

■ Ambient Temperature

- Be sure to use the fiber optic sensors within the rated ambient temperature range.
- Physical property changes in the optical fiber and components may occur due to temperature variations (e.g., refractive index, optical loss, thermal expansion, component output/sensitivity, target reflectivity, etc.).

■ Minimum Target Object Size

- The mininum target object size specifications are based on the maximum sensitivity setting of BF4 Series fiber optic amplifiers.

■ Sensing Distance

- The sensing distance data is based on internal testing and for reference only. Performance may vary by installation and usage environment. Product testing prior to use is recommended.
- The sensing distance data is based on measurements using non-glossy white paper.
- The sensing distances may vary depending on the measurement standards of the tested amplifiers and sensing target objects.
- The sensing distances for each amplifier series are from the following models.
  : BFN-□, BFN-D□-□-□-IL3, BFX-D1-□, BF5R-□1-□, BF4R□-□, BF3RX-□
- The response time for each response mode are as shown:

MFST	UFST	FST	STD	LONG	ULOG	MLOG	MAX (BF4 / BF3)
25 µs	50 µs	150 µs	500 µs	4 ms	10 ms	20 ms	0.5 ms / 1 ms

- The sensing distances for BFN series are based on the reponse time setting of the equivalent response mode.
- The sensing mode of BF4/3 are based on maximum sensitivity settings.
- For BF4G□-□ models, apply 10% of the sensing distance of BF4R□-□ models.
- Deviations in sensing distance may occur due to the following conditions.
  - Fiber optic unit properties: cable bend radius, condition of cutting surface, amplifier insertion depth, etc.
  - Sensing target object properties: material, shape, inclination, bending, gloss, etc.
- For detection area characteristics, refer to the product manual of the fiber optic amplifiers.

■ Adapter

- For compatible models, be sure to attach the included adapter before use.
- Check the product components or the symbols below.

●: Supports included adapter or adapters sold separately.
(supports only fiber optic amplifiers BFN, BFX, BF5, BF4 Series. In case of BF3 Series, the adapter needs to be purchased separately.)
○: Only supports the included adapter. Cannot be purchased separately.
- : Adapters are not supported.

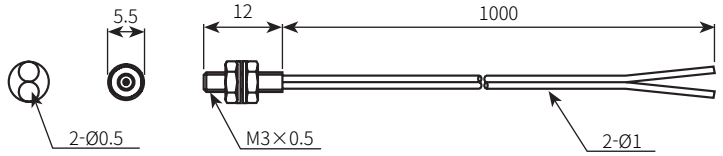
Threaded Head: Standard Type

Appearance	Model	Cable		Ambient temperature	Min. size of target object	Sensing distance (Typical, unit: mm)							Adapter
		Length	Bend radius			Mode \ Amp.	BFN	BFN-D	BFX	BF5	BF4	BF3	
	FD-310-05	1 m (FREE CUT)	R15	-40 to 70 °C	Ø 0.03 mm	MFST	-	90	-	-	-	-	●
						UFST	55	155	15	15	-	-	
						FST	100	310	20	25	-	-	
						STD	135	715	40	50	-	-	
						LONG	-	1370	90	115	-	-	
						ULOG	-	1920	185	220	-	-	
						MLOG / MAX	-	3120	-	-	40	30	
	FD-320-05	2 m (FREE CUT)	R15	-40 to 70 °C	Ø 0.03 mm	MFST	-	60	-	-	-	-	●
						UFST	30	90	10	10	-	-	
						FST	60	185	20	15	-	-	
						STD	100	435	25	30	-	-	
						LONG	-	655	65	70	-	-	
						ULOG	-	1030	140	105	-	-	
						MLOG / MAX	-	2280	-	-	40	35	
	FD-420-05	2 m (FREE CUT)	R15	-40 to 70 °C	Ø 0.03 mm	MFST	-	90	-	-	-	-	●
						UFST	30	155	15	15	-	-	
						FST	55	340	20	25	-	-	
						STD	80	620	40	55	-	-	
						LONG	-	870	80	100	-	-	
						ULOG	-	1725	110	140	-	-	
						MLOG / MAX	-	3095	-	-	40	5	
	FD-620-10	2 m (FREE CUT)	R25	-40 to 70 °C	Ø 0.03 mm	MFST	-	495	-	-	-	-	-
						UFST	120	745	70	80	-	-	
						FST	180	1590	105	120	-	-	
						STD	245	2525	180	255	-	-	
						LONG	-	3275	345	405	-	-	
						ULOG	-	4485	460	525	-	-	
						MLOG / MAX	-	5255	-	-	120	20	
	FD-320-F	2 m (FREE CUT)	R10	-40 to 70 °C	Ø 0.03 mm	MFST	-	120	-	-	-	-	●
						UFST	30	185	15	20	-	-	
						FST	55	370	20	30	-	-	
						STD	85	745	40	60	-	-	
						LONG	-	1060	95	120	-	-	
						ULOG	-	1920	140	170	-	-	
						MLOG / MAX	-	3620	-	-	40	40	
	FD-320-F1	2 m (FREE CUT)	R10	-40 to 70 °C	Ø 0.03 mm	MFST	-	155	-	-	-	-	●
						UFST	45	280	20	25	-	-	
						FST	80	590	40	45	-	-	
						STD	120	1090	60	95	-	-	
						LONG	-	1560	140	175	-	-	
						ULOG	-	2375	220	250	-	-	
						MLOG / MAX	-	3380	-	-	60	20	
	FD-620-F2	2 m (FREE CUT)	R30	-40 to 70 °C	Ø 0.03 mm	MFST	-	495	-	-	-	-	-
						UFST	125	870	75	80	-	-	
						FST	190	1715	110	140	-	-	
						STD	285	2930	185	275	-	-	
						LONG	-	4115	355	470	-	-	
						ULOG	-	5040	495	660	-	-	
						MLOG / MAX	-	6165	-	-	120	20	

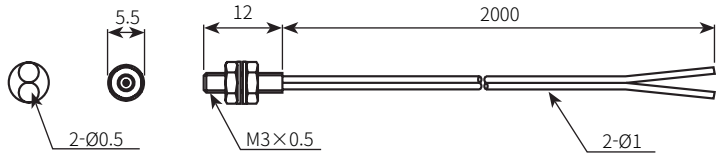
■ Dimensions

• Unit: mm (Refer to the CAD files from the Autonics website for exact dimensions)

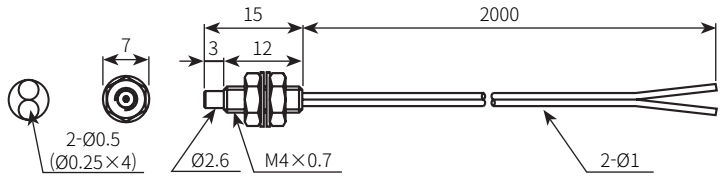
• FD-310-05



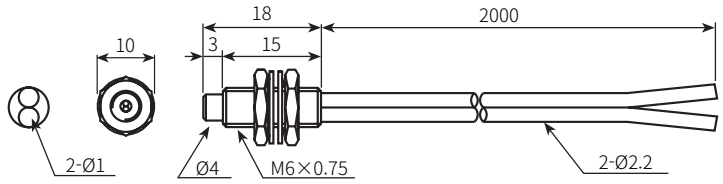
• FD-320-05



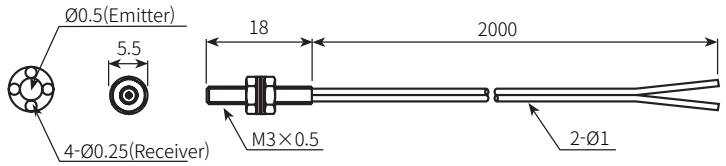
• FD-420-05



• FD-620-10

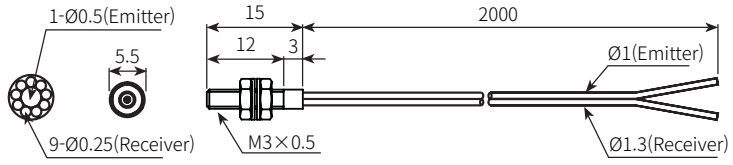


• FD-320-F

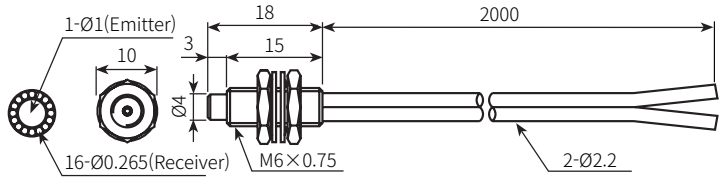


• FD-320-F1

When connecting to the amplifier, be careful not to swap the emitter and receiver cables..
Emitter adapter (black), receiver adapter (dark gray)



• FD-620-F2



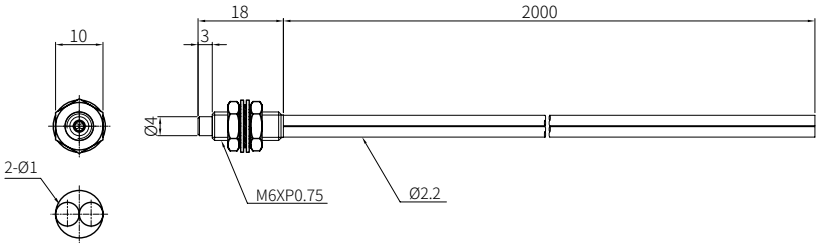
Threaded Head: Heat-Resistant Type

Appearance	Model	Cable		Ambient temperature	Min. size of target object	Sensing distance (Typical, unit: mm)							Adapter
		Length	Bend radius			Mode \ Amp.	BFN	BFN-D	BFX	BF5	BF4	BF3	
	FD-620-10H	2 m (FREE CUT)	R25	-40 to 105 °C	Ø 0.08 mm	MFST	-	495	-	-	-	-	-
						UFST	100	810	75	80	-	-	
						FST	165	1870	115	130	-	-	
						STD	260	2680	170	300	-	-	
						LONG	-	3120	300	430	-	-	
						ULOG	-	4390	520	500	-	-	
						MLOG / MAX	-	5015	-	-	200	185	
	FD-620-15H1	2 m (FREE CUT)	R35	-40 to 150 °C	Ø 0.08 mm	MFST	-	530	-	-	-	-	-
						UFST	100	840	80	85	-	-	
						FST	160	1715	115	135	-	-	
						STD	215	2650	175	275	-	-	
						LONG	-	3460	340	425	-	-	
						ULOG	-	4535	440	555	-	-	
						MLOG / MAX	-	5615	-	-	165	150	
	GD-420-20H2	2 m	R25	-40 to 250 °C	Ø 0.08 mm	MFST	-	590	-	-	-	-	-
						UFST	55	995	70	95	-	-	
						FST	100	2055	110	160	-	-	
						STD	245	3365	175	330	-	-	
						LONG	-	4645	325	540	-	-	
						ULOG	-	5760	495	745	-	-	
						MLOG / MAX	-	6260	-	-	180	N/A	
	GD-620-20H2	2 m	R25	-40 to 250 °C	Ø 0.08 mm	MFST	-	530	-	-	-	-	-
						UFST	95	870	75	85	-	-	
						FST	140	1870	110	140	-	-	
						STD	200	2930	175	300	-	-	
						LONG	-	3865	340	470	-	-	
						ULOG	-	4560	440	620	-	-	
						MLOG / MAX	-	5780	-	-	195	N/A	
	GD-620-12H3	2 m	R25	-60 to 350 °C	Ø 0.08 mm	MFST	-	560	-	-	-	-	-
						UFST	45	935	80	90	-	-	
						FST	95	1680	115	150	-	-	
						STD	240	2620	180	270	-	-	
						LONG	-	3615	320	420	-	-	
						ULOG	-	4560	450	580	-	-	
						MLOG / MAX	-	5280	-	-	190	N/A	

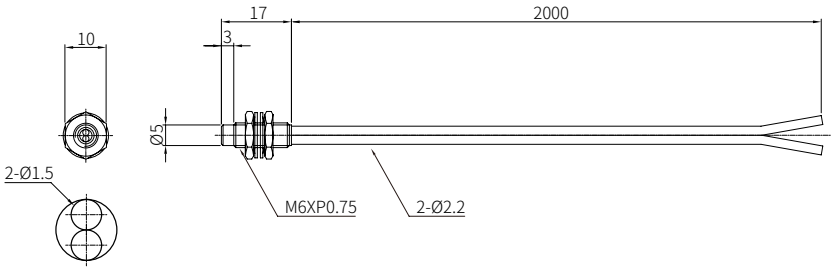
■ Dimensions

- Unit: mm (Refer to the CAD files from the Autonics website for exact dimensions)

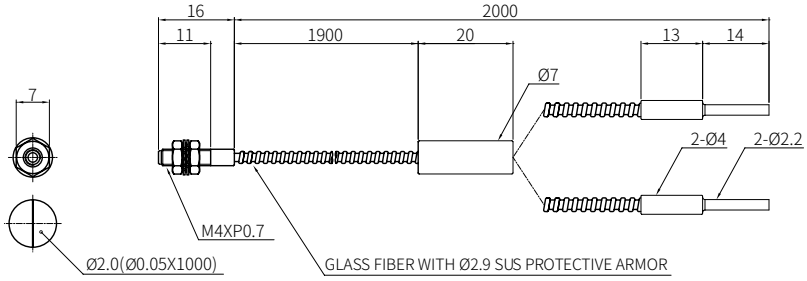
• FD-620-10H



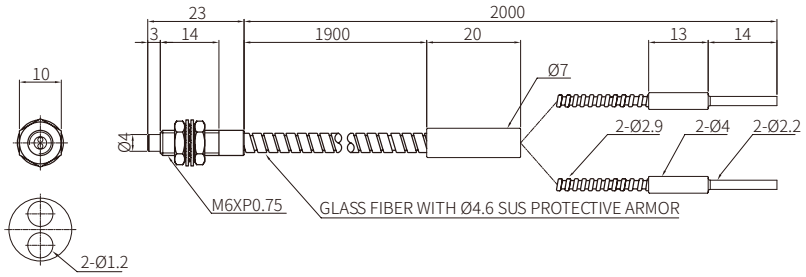
• FD-620-15H1



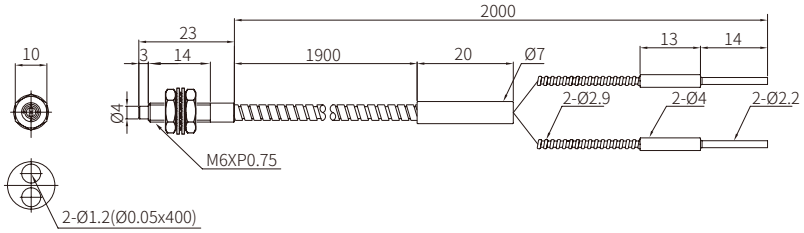
• GD-420-20H2



• GD-620-20H2



• GD-620-12H3



Threaded Head: Vaccum-Resistant Type

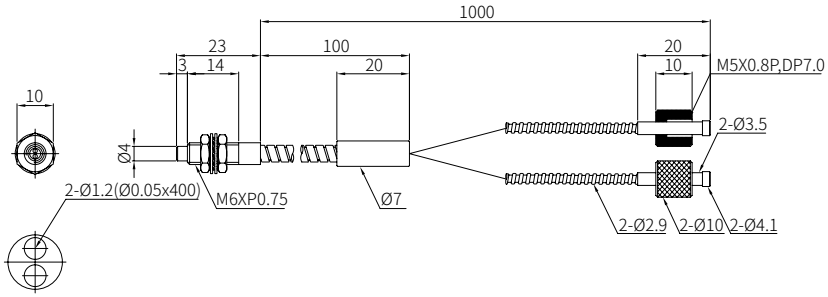
- Vaccum-resistant fiber optic units must be used in combination with fiber optic couplers and atmospheric fiber optic units.
- The sensing distances of vacuum-resistant fiber optic units are specified based on installation with atmospheric fiber optic units. (FU-VA0□, sold separately)

Appearance	Model	Cable		Ambient temperature	Min. size of target object	Sensing distance (Typical, unit: mm)							Adapter
		Length	Bend radius			Amp. / Mode	BFN	BFN-D	BFX	BF5	BF4	BF3	
	GD-610-12V2	1 m	R25	-60 to 250 °C	Ø 0.08 mm (+ FU-VA01)	MFST	-	370	-	-	-	-	-
						UFST	45	560	20	60	-	-	
						FST	80	1120	30	90	-	-	
						STD	110	1805	55	180	-	-	
						LONG	-	2370	100	290	-	-	
						ULOG	-	3140	230	380	-	-	
						MLOG / MAX	-	4175	-	-	95	80	
					Ø 0.08 mm (+ FU-VA02)	MFST	-	245	-	-	-	-	-
						UFST	80	370	10	40	-	-	
						FST	120	745	20	60	-	-	
						STD	160	1435	35	120	-	-	
						LONG	-	1930	80	230	-	-	
						ULOG	-	2760	160	310	-	-	
						MLOG / MAX	-	3600	-	-	70	60	

■ Dimensions

- Unit: mm (Refer to the CAD files from the Autonics website for exact dimensions)

• GD-610-12V2



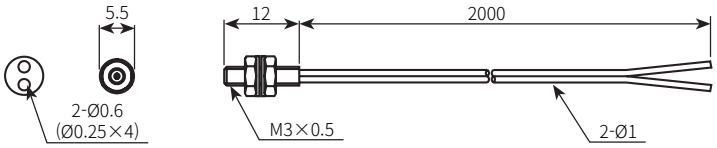
Threaded Head: Bend-Resistant Type

Appearance	Model	Cable		Ambient temperature	Min. size of target object	Sensing distance (Typical, unit: mm)							Adapter
		Length	Bend radius			Mode \ Amp.	BFN	BFN-D	BFX	BF5	BF4	BF3	
	FD-320-06B	2 m (FREE CUT)	R5	-40 to 60 °C	Ø 0.0125 mm	MFST	-	90	-	-	-	-	●
						UFST	20	155	15	15	-	-	
						FST	45	340	20	25	-	-	
						STD	70	620	35	55	-	-	
						LONG	-	900	80	100	-	-	
						ULOG	-	1080	105	145	-	-	
						MLOG / MAX	-	1580	-	-	35	35	
	FD-420-06B	2 m (FREE CUT)	R5	-40 to 60 °C	Ø 0.0125 mm	MFST	-	90	-	-	-	-	●
						UFST	25	155	15	15	-	-	
						FST	45	370	20	25	-	-	
						STD	75	620	40	60	-	-	
						LONG	-	900	85	100	-	-	
						ULOG	-	1100	115	145	-	-	
						MLOG / MAX	-	1580	-	-	35	40	
	FD-620-13B	2 m	R5	-40 to 60 °C	Ø 0.0125 mm	MFST	-	155	-	-	-	-	
						UFST	85	245	40	25	-	-	
						FST	125	495	60	40	-	-	
						STD	165	1965	105	80	-	-	
						LONG	-	2555	230	315	-	-	
						ULOG	-	3620	320	410	-	-	
						MLOG / MAX	-	4580	-	-	100	15	

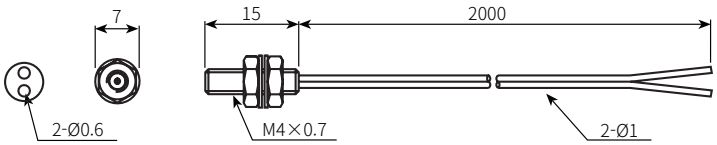
■ Dimensions

• Unit: mm (Refer to the CAD files from the Autonics website for exact dimensions)

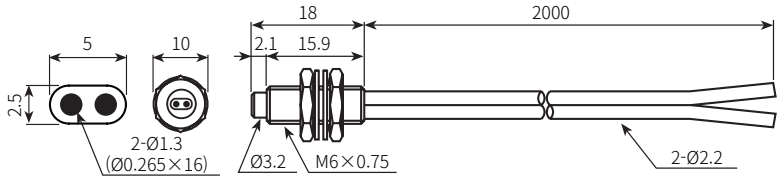
• FD-320-06B



• FD-420-06B



• FD-620-13B



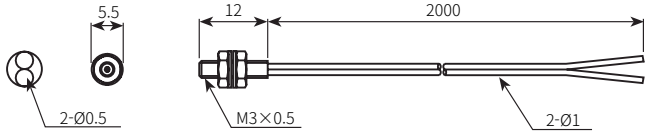
Threaded Head: Flexible Type

Appearance	Model	Cable		Ambient temperature	Min. size of target object	Sensing distance (Typical, unit: mm)							Adapter
		Length	Bend radius			Mode \ Amp.	BFN	BFN-D	BFX	BF5	BF4	BF3	
	FD-320-05R	2 m (FREE CUT)	R1	-40 to 60 °C	Ø 0.0125 mm	MFST	-	30	-	-	-	-	●
						UFST	15	90	10	5	-	-	
						FST	35	215	15	15	-	-	
						STD	55	370	25	35	-	-	
						LONG	-	590	60	60	-	-	
						ULOG	-	740	90	95	-	-	
						MLOG / MAX	-	1200	-	-	35	35	
	FD-420-05R	2 m (FREE CUT)	R1	-40 to 60 °C	Ø 0.0125 mm	MFST	-	60	-	-	-	-	●
						UFST	15	120	5	10	-	-	
						FST	30	215	10	20	-	-	
						STD	85	495	20	35	-	-	
						LONG	-	745	40	80	-	-	
						ULOG	-	1055	60	120	-	-	
						MLOG / MAX	-	1460	-	-	35	30	
	FD-620-10R	2 m (FREE CUT)	R1	-40 to 60 °C	Ø 0.04 mm	MFST	-	340	-	-	-	-	
						UFST	55	530	45	55	-	-	
						FST	95	810	70	85	-	-	
						STD	135	2090	120	130	-	-	
						LONG	-	2995	275	335	-	-	
						ULOG	-	3840	420	480	-	-	
						MLOG / MAX	-	4750	-	-	130	15	

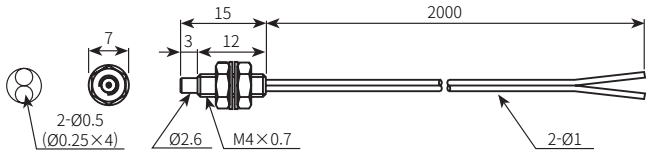
■ Dimensions

• Unit: mm (Refer to the CAD files from the Autonics website for exact dimensions)

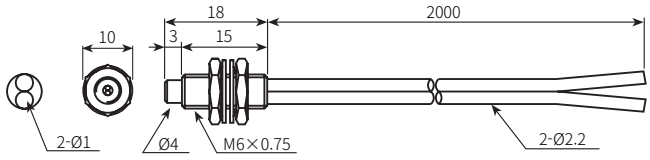
• FD-320-05R



• FD-420-05R



• FD-620-10R



Cylindrical Head: Standard Type

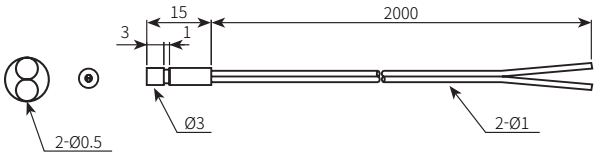
Appearance	Model	Cable		Ambient temperature	Min. size of target object	Sensing distance (Typical, unit: mm)						Adapter
		Length	Bend radius			Mode \ Amp.	BFN	BFN-D	BFX	BF5	BF4	BF3	
	FDC-320-05	2 m (FREE CUT)	R15	-40 to 70 °C	Ø 0.03 mm	MFST	-	90	-	-	-	-	●
						UFST	25	120	15	15	-	-	
						FST	50	310	20	20	-	-	
						STD	75	530	40	50	-	-	
						LONG	-	870	80	85	-	-	
						ULOG	-	1080	120	140	-	-	
						MLOG / MAX	-	1460	-	-	40	35	
	FDC-320-F 01)	2 m (FREE CUT)	R10	-40 to 70 °C	Ø 0.03 mm	MFST	-	90	-	-	-	-	●
						UFST	25	155	15	15	-	-	
						FST	50	340	20	25	-	-	
						STD	80	685	35	55	-	-	
						LONG	-	995	80	110	-	-	
						ULOG	-	1440	120	160	-	-	
						MLOG / MAX	-	2110	-	-	40	5	

01) Lens unit for micro spot (FDC-2, sold separately) can be attached.

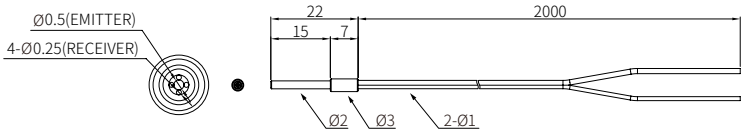
■ Dimensions

- Unit: mm (Refer to the CAD files from the Autonics website for exact dimensions)

• FDC-320-05



• FDC-320-F



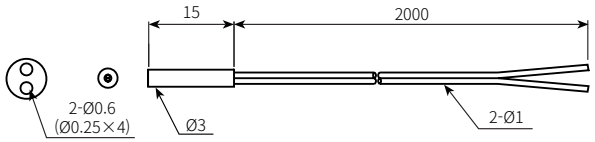
Cylindrical Head: Bend-Resistant Type

Appearance	Model	Cable		Ambient temperature	Min. size of target object	Sensing distance (Typical, unit: mm)						Adapter
		Length	Bend radius			Mode \ Amp.	BFN	BFN-D	BFX	BF5	BF4	BF3	
	FDC-320-06B	2 m (FREE CUT)	R5	-40 to 60 °C	Ø 0.0125 mm	MFST	-	60	-	-	-	-	●
						UFST	25	120	15	10	-	-	
						FST	55	310	20	20	-	-	
						STD	80	530	40	50	-	-	
						LONG	-	715	85	85	-	-	
						ULOG	-	885	120	115	-	-	
						MLOG / MAX	-	1055	-	-	35	5	

■ Dimensions

- Unit: mm (Refer to the CAD files from the Autonics website for exact dimensions)

• FDC-320-06B



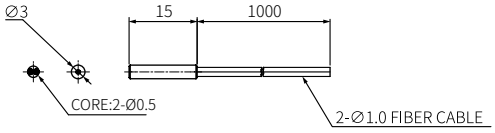
Cylindrical Head: Flexible Type

Appearance	Model	Cable		Ambient temperature	Min. size of target object	Sensing distance (Typical, unit: mm)						Adapter
		Length	Bend radius			Amp. / Mode	BFN	BFN-D	BFX	BF5	BF4	BF3	
	FDC-310-10R	1 m (FREE CUT)	R1	-30 to 70°C	Ø 0.08 mm	MFST	-	55	-	-	-	-	●
						UFST	15	100	10	15	-	-	
						FST	30	175	30	40	-	-	
						STD	45	310	60	80	-	-	
						LONG	-	575	125	150	-	-	
						ULOG	-	775	200	245	-	-	
						MLOG / MAX	-	1040	-	-	80	60	

■ Dimensions

- Unit: mm (Refer to the CAD files from the Autonics website for exact dimensions)

• FDC-310-10R



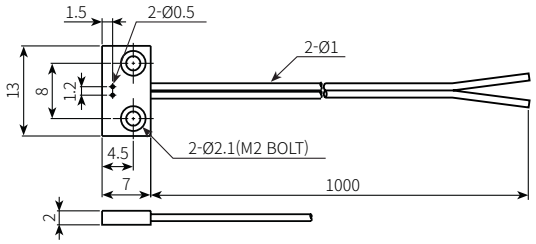
Flat Head: Flexible Type

Appearance	Model	Cable		Ambient temperature	Min. size of target object	Sensing distance (Typical, unit: mm)						Adapter
		Length	Bend radius			Mode \ Amp.	BFN	BFN-D	BFX	BF5	BF4	BF3	
	FDF-210-05R	1 m (FREE CUT)	R1	-40 to 60 °C	Ø 0.0125 mm	MFST	-	60	-	-	-	-	●
						UFST	10	120	10	10	-	-	
						FST	20	185	15	20	-	-	
						STD	35	370	25	30	-	-	
						LONG	-	590	55	60	-	-	
						ULOG	-	790	60	95	-	-	
						MLOG / MAX	-	1100	-	-	20	10	
	FDFN-210-05R	1 m (FREE CUT)	R1	-40 to 60 °C	Ø 0.0125 mm	MFST	-	60	-	-	-	-	●
						UFST	10	90	5	10	-	-	
						FST	20	185	10	15	-	-	
						STD	40	435	25	30	-	-	
						LONG	-	655	65	70	-	-	
						ULOG	-	910	100	105	-	-	
						MLOG / MAX	-	1295	-	-	20	15	
	FDFU-210-05R	1 m (FREE CUT)	R1	-40 to 60 °C	Ø 0.0125 mm	MFST	-	30	-	-	-	-	●
						UFST	15	90	10	5	-	-	
						FST	30	215	15	15	-	-	
						STD	45	560	25	35	-	-	
						LONG	-	810	65	90	-	-	
						ULOG	-	1150	105	130	-	-	
						MLOG / MAX	-	1580	-	-	35	10	

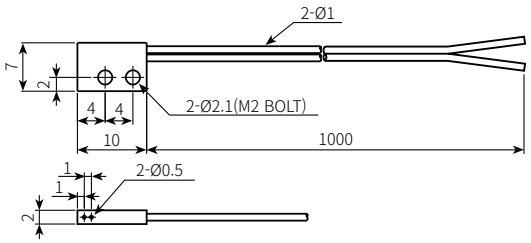
■ Dimensions

- Unit: mm (Refer to the CAD files from the Autonics website for exact dimensions)

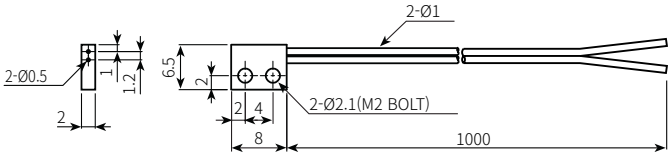
• FDF-210-05R
Hood material: stainless steel 303, flat view



• FDFN-210-05R
Hood material: stainless steel 303, side view



• FDFU-210-05R
Hood material: stainless steel 303, top view



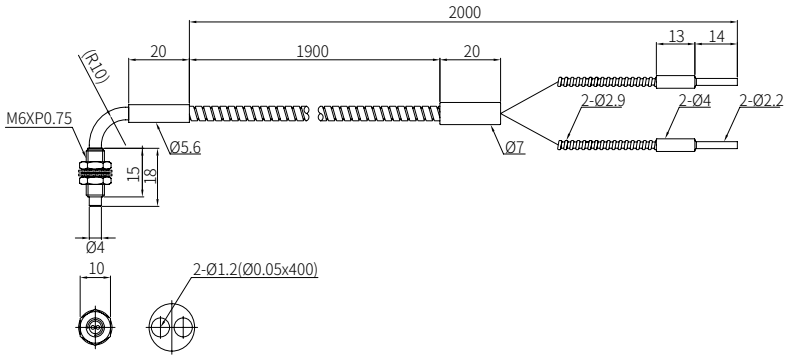
L-Type Head: Heat-Resistant Type

Appearance	Model	Cable		Ambient temperature	Min. size of target object	Sensing distance (Typical, unit: mm)							Adapter
		Length	Bend radius			Mode \ Amp.	BFN	BFN-D	BFX	BF5	BF4	BF3	
	GDL-620-12H2	2 m	R25	-60 to 250 °C	Ø 0.08 mm	MFST	-	495	-	-	-	-	-
						UFST	100	810	80	80	-	-	
						FST	160	1620	125	130	-	-	
						STD	220	2680	200	260	-	-	
						LONG	-	3680	355	430	-	-	
						ULOG	-	4560	545	590	-	-	
						MLOG / MAX	-	5540	-	-	200	N/A	
	GDL-620-12H3	2 m	R25	-60 to 350 °C	Ø 0.08 mm	MFST	-	495	-	-	-	-	-
						UFST	100	870	75	80	-	-	
						FST	175	1620	110	140	-	-	
						STD	245	2555	160	260	-	-	
						LONG	-	3430	300	410	-	-	
						ULOG	-	4320	460	550	-	-	
						MLOG / MAX	-	5565	-	-	175	N/A	

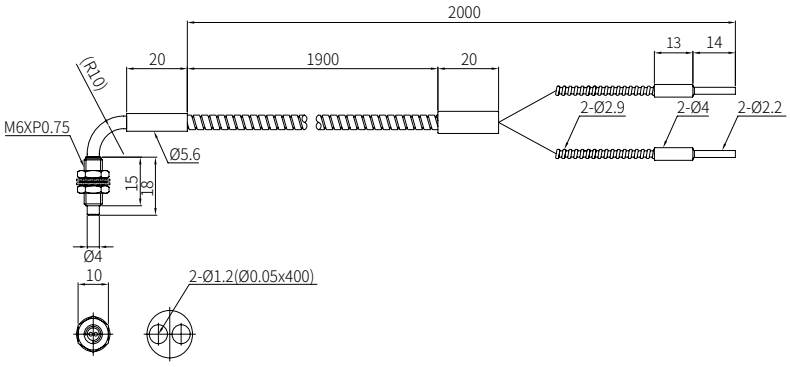
■ Dimensions

- Unit: mm (Refer to the CAD files from the Autonics website for exact dimensions)

• GDL-620-12H2



• GDL-620-12H3



L-Type Head: Vacuum-Resistant Type

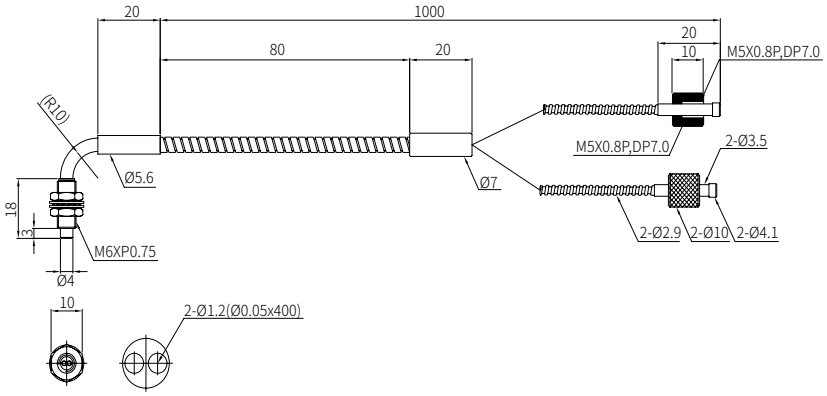
- Vaccum-resistant fiber optic units must be used in combination with fiber optic couplers and atmospheric fiber optic units.
- The sensing distances of vacuum-resistant fiber optic units are specified based on installation with atmospheric fiber optic units. (FU-VA0□, sold separately)

Appearance	Model	Cable		Ambient temperature	Min. size of target object	Sensing distance (Typical, unit: mm)							Adapter
		Length	Bend radius			Amp. / Mode	BFN	BFN-D	BFX	BF5	BF4	BF3	
	GDL-610-12V2	1 m	R25	-60 to 250 °C	Ø 0.08 mm (+ FU-VA01)	MFST	-	370	-	-	-	-	-
						UFST	50	560	40	60	-	-	
						FST	85	1120	55	90	-	-	
						STD	120	1870	90	180	-	-	
						LONG	-	2370	185	300	-	-	
						ULOG	-	3360	255	380	-	-	
						MLOG / MAX	-	4320	-	-	80	80	
					Ø 0.08 mm (+ FU-VA02)	MFST	-	245	-	-	-	-	-
						UFST	80	370	20	40	-	-	
						FST	120	810	35	60	-	-	
						STD	160	1435	60	130	-	-	
						LONG	-	1995	130	230	-	-	
						ULOG	-	2615	185	320	-	-	
						MLOG / MAX	-	3285	-	-	55	60	

■ Dimensions

- Unit: mm (Refer to the CAD files from the Autonics website for exact dimensions)

• GDL-610-12V2



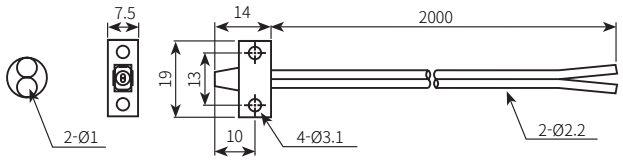
Molded Plastic Head: Standard Type

Appearance	Model	Cable		Ambient temperature	Min. size of target object	Sensing distance (Typical, unit: mm)						Adapter
		Length	Bend radius			Mode \ Amp.	BFN	BFN-D	BFX	BF5	BF4	BF3	
	FDP-320-10	2 m (FREE CUT)	R25	-40 to 70 °C	Ø 0.03 mm	MFST	-	405	-	-	-	-	-
						UFST	40	620	55	65	-	-	
						FST	55	995	75	100	-	-	
						STD	70	1435	110	160	-	-	
						LONG	-	1745	175	230	-	-	
						ULOG	-	2160	200	280	-	-	
						MLOG / MAX	-	2975	-	-	120	15	

■ Dimensions

- Unit: mm (Refer to the CAD files from the Autonics website for exact dimensions)

• FDP-320-10



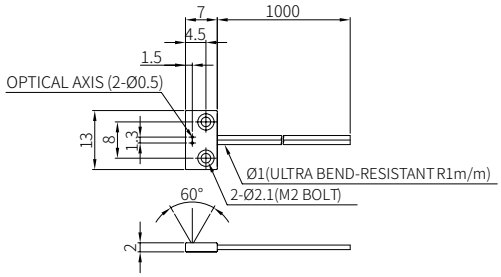
Molded Plastic Head: Flexible Type

Appearance	Model	Cable		Ambient temperature	Min. size of target object	Sensing distance (Typical, unit: mm)						Adapter
		Length	Bend radius			Mode \ Amp.	BFN	BFN-D	BFX	BF5	BF4	BF3	
	FDPF-210-05R	1 m (FREE CUT)	R1	-30 to 70 °C	Ø 0.08 mm	MFST	-	120	-	-	-	-	●
						UFST	10	185	10	20	-	-	
						FST	20	435	20	30	-	-	
						STD	40	870	35	70	-	-	
						LONG	-	1310	80	140	-	-	
						ULOG	-	1870	115	210	-	-	
						MLOG / MAX	-	2230	-	-	25	30	

■ Dimensions

- Unit: mm (Refer to the CAD files from the Autonics website for exact dimensions)

• FDPF-210-05R



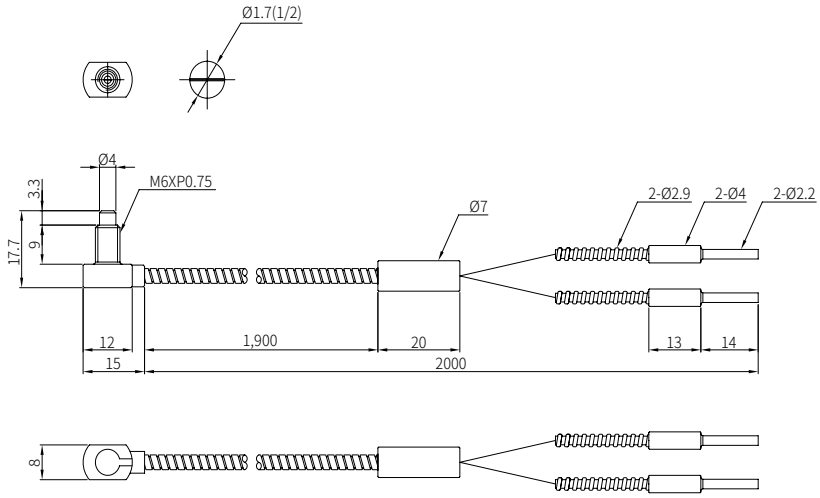
Perpendicular Head: Heat-Resistant Type

Appearance	Model	Cable		Ambient temperature	Min. size of target object	Sensing distance (Typical, unit: mm)							Adapter
		Length	Bend radius			Mode \ Amp.	BFN	BFN-D	BFX	BF5	BF4	BF3	
	GDR-620-17H2	2 m	R25	-60 to 250 °C	Ø 0.08 mm	MFST	-	495	-	-	-	-	-
						UFST	120	870	80	80	-	-	
						FST	205	1560	120	140	-	-	
						STD	280	2555	200	250	-	-	
						LONG	-	3365	320	410	-	-	
						ULOG	-	4100	405	540	-	-	
						MLOG / MAX	-	5060	-	-	310	N/A	
	GDR-620-17H3	2 m	R25	-60 to 350 °C	Ø 0.08 mm	MFST	-	495	-	-	-	-	-
						UFST	125	870	65	80	-	-	
						FST	215	1620	110	140	-	-	
						STD	285	2555	165	260	-	-	
						LONG	-	3490	335	410	-	-	
						ULOG	-	4320	560	560	-	-	
						MLOG / MAX	-	5350	-	-	185	N/A	

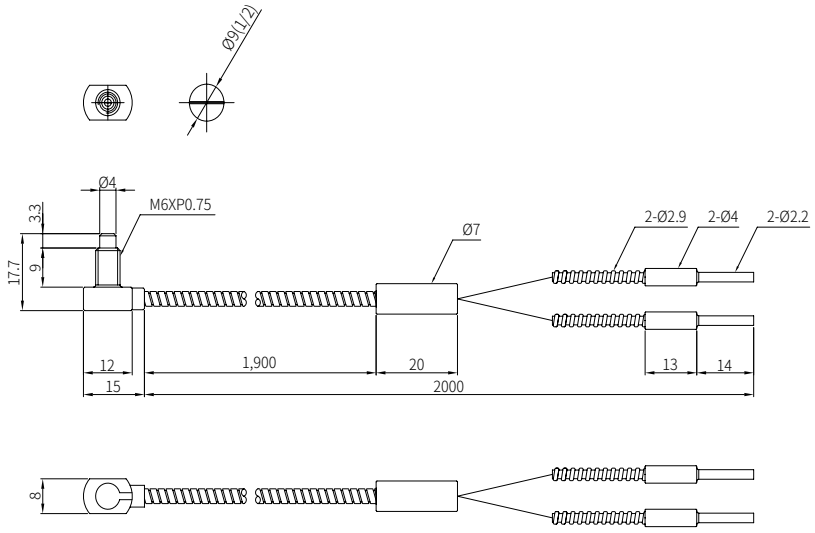
■ Dimensions

- Unit: mm (Refer to the CAD files from the Autonics website for exact dimensions)

• GDR-620-17H2



• GDR-620-17H3



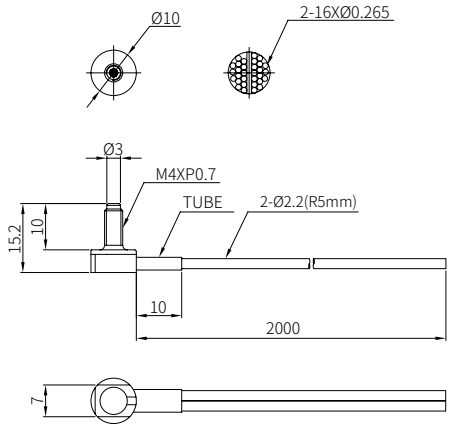
Perpendicular Head: Bend-Resistant Type

Appearance	Model	Cable		Ambient temperature	Min. size of target object	Sensing distance (Typical, unit: mm)						Adapter
		Length	Bend radius			Mode \ Amp.	BFN	BFN-D	BFX	BF5	BF4	BF3	
	FDRT-420-02B	2 m (FREE CUT)	R5	-30 to 70 °C	Ø 0.08 mm	MFST	-	435	-	-	-	-	-
						UFST	60	685	50	70	-	-	
						FST	110	1435	70	110	-	-	
						STD	160	2430	125	230	-	-	
						LONG	-	3365	250	390	-	-	
						ULOG	-	4295	440	540	-	-	
						MLOG / MAX	-	4990	-	-	80	120	

■ Dimensions

- Unit: mm (Refer to the CAD files from the Autonics website for exact dimensions)

• FDRT-420-02B



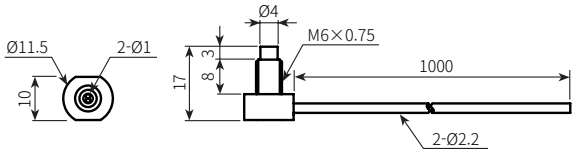
Perpendicular Head: Flexible Type

Appearance	Model	Cable		Ambient temperature	Min. size of target object	Sensing distance (Typical, unit: mm)						Adapter
		Length	Bend radius			Mode \ Amp.	BFN	BFN-D	BFX	BF5	BF4	BF3	
	FDR-610-10R	1 m (FREE CUT)	R1	-40 to 60 °C	Ø 0.04 mm	MFST	-	280	-	-	-	-	-
						UFST	45	530	40	45	-	-	
						FST	60	745	60	85	-	-	
						STD	120	2150	110	120	-	-	
						LONG	-	3025	265	345	-	-	
						ULOG	-	3720	440	485	-	-	
						MLOG / MAX	-	4580	-	-	160	5	

■ Dimensions

- Unit: mm (Refer to the CAD files from the Autonics website for exact dimensions)

- **FDR-610-10R**
  Hood material: stainless steel 303



Stainless Steel Head: Standard Type

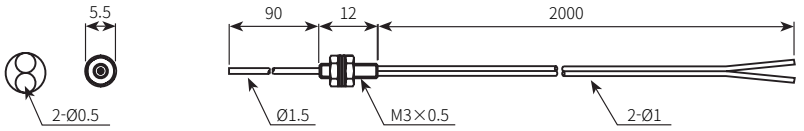
Appearance	Model	Cable		Ambient temperature	Min. size of target object	Sensing distance (Typical, unit: mm)							Adapter
		Length	Bend radius			Mode \ Amp.	BFN	BFN-D	BFX	BF5	BF4	BF3	
	FDS-320-05	2 m (FREE CUT)	R15 (stainless steel part R10)	-40 to 70 °C	Ø 0.03 mm	MFST	-	90	-	-	-	-	-
						UFST	20	185	15	15	-	-	
						FST	45	435	25	30	-	-	
						STD	70	745	45	70	-	-	
						LONG	-	1495	100	120	-	-	
						ULOG	-	2160	180	240	-	-	
						MLOG / MAX	-	3140	-	-	40	5	
	FDS-420-05	2 m (FREE CUT)	R15 (stainless steel part R10)	-40 to 70 °C	Ø 0.03 mm	MFST	-	90	-	-	-	-	●
						UFST	20	155	20	15	-	-	
						FST	55	405	30	25	-	-	
						STD	85	745	50	65	-	-	
						LONG	-	1120	135	120	-	-	
						ULOG	-	1630	180	180	-	-	
						MLOG / MAX	-	2085	-	-	40	5	
	FDS-620-10	2 m (FREE CUT)	R25 (stainless steel part R10)	-40 to 70 °C	Ø 0.03 mm	MFST	-	465	-	-	-	-	–
						UFST	135	840	70	75	-	-	
						FST	140	1650	110	135	-	-	
						STD	175	2710	180	265	-	-	
						LONG	-	4085	315	435	-	-	
						ULOG	-	4775	580	655	-	-	
						MLOG / MAX	-	5520	-	-	120	5	
	FDS2-320-05	2 m (FREE CUT)	R15 (stainless steel part R10)	-40 to 70 °C	Ø 0.03 mm	MFST	-	90	-	-	-	-	●
						UFST	25	155	15	15	-	-	
						FST	55	370	20	25	-	-	
						STD	85	840	40	60	-	-	
						LONG	-	1435	95	135	-	-	
						ULOG	-	1920	175	230	-	-	
						MLOG / MAX	-	2685	-	-	40	5	
	FDS2-420-05	2 m (FREE CUT)	R15 (stainless steel part R10)	-40 to 70 °C	Ø 0.03 mm	MFST	-	120	-	-	-	-	●
						UFST	30	185	20	20	-	-	
						FST	55	435	30	30	-	-	
						STD	85	780	55	70	-	-	
						LONG	-	1245	135	125	-	-	
						ULOG	-	1920	240	200	-	-	
						MLOG / MAX	-	2615	-	-	40	10	
	FDS2-620-10	2 m (FREE CUT)	R25 (stainless steel part R10)	-40 to 70 °C	Ø 0.03 mm	MFST	-	495	-	-	-	-	–
						UFST	80	810	65	80	-	-	
						FST	175	1525	100	130	-	-	
						STD	245	2835	160	245	-	-	
						LONG	-	3525	320	455	-	-	
						ULOG	-	4320	680	565	-	-	
						MLOG / MAX	-	5060	-	-	120	5	
	FDCS-320-05	2 m (FREE CUT)	R15 (stainless steel part R10)	-40 to 70 °C	Ø 0.03 mm	MFST	-	10	-	-	-	-	●
						UFST	30	15	10	10	-	-	
						FST	60	45	20	15	-	-	
						STD	100	90	40	30	-	-	
						LONG	-	120	100	80	-	-	
						ULOG	-	190	175	150	-	-	
						MLOG / MAX	-	335	-	-	40	5	
	FDCSN-320-05	2 m	R15	-40 to 60 °C	Ø 0.0125 mm	MFST	-	30	-	-	-	-	○ 01)
						UFST	3	90	6	5	-	-	
						FST	5	185	8	15	-	-	
						STD	15	310	10	30	-	-	
						LONG	-	620	35	50	-	-	
						ULOG	-	910	70	100	-	-	
						MLOG / MAX	-	1220	-	-	15	5	

01) The adapter for this model is not compatible with separately sold adapters and cannot be purchased separately. Please take care not to lose it.

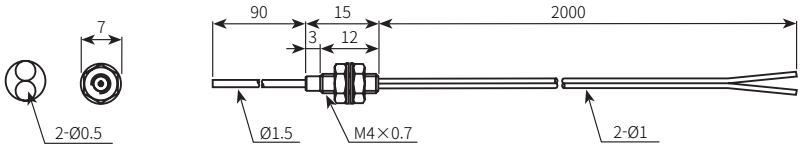
■ Dimensions

• Unit: mm (Refer to the CAD files from the Autonics website for exact dimensions)

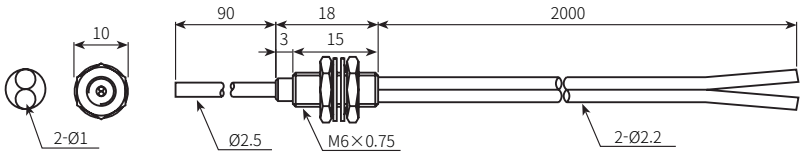
• FDS-320-05



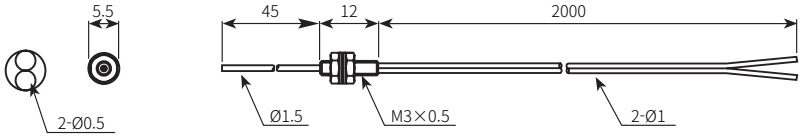
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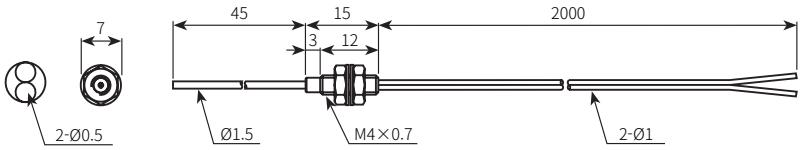
• FDS-620-10



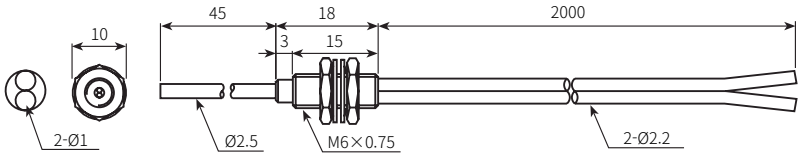
• FDS2-320-05



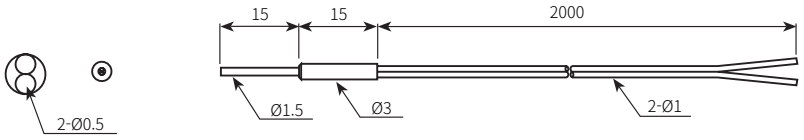
• FDS2-420-05



• FDS2-620-10

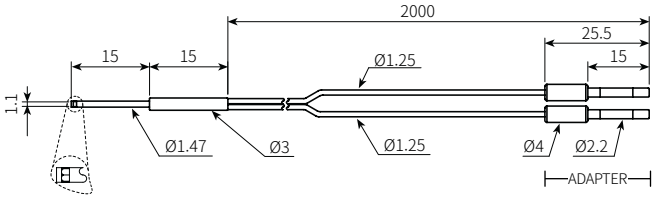


• FDCS-320-05



• FDCSN-320-05

Side view



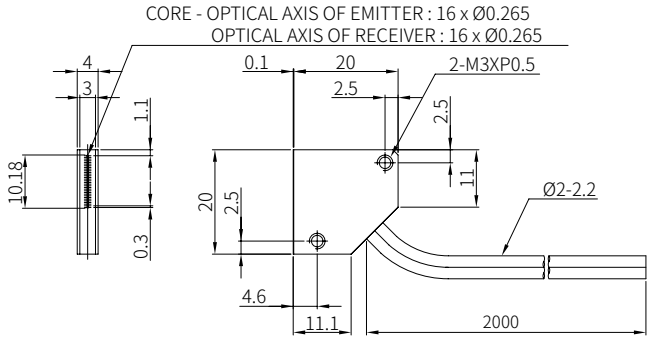
Wide Area Head: Bend-Resistant Type

Appearance	Model	Cable		Ambient temperature	Min. size of target object	Sensing distance (Typical, unit: mm)							Adapter
		Length	Bend radius			Mode \ Amp.	BFN	BFN-D	BFX	BF5	BF4	BF3	
	FDW10-320-02B	2 m (FREE CUT)	R5	-30 to 70 °C	Ø 0.08 mm	MFST	-	465	-	-	-	-	-
						UFST	100	745	40	75	-	-	
						FST	160	1435	60	120	-	-	
						STD	205	2430	100	230	-	-	
						LONG	-	3180	240	390	-	-	
						ULOG	-	4080	385	510	-	-	
						MLOG / MAX	-	4845	-	-	150	80	
	FDW10T-320-02B	2 m (FREE CUT)	R5	-30 to 70 °C	Ø 0.08 mm	MFST	-	465	-	-	-	-	-
						UFST	95	745	45	75	-	-	
						FST	140	1435	70	120	-	-	
						STD	180	2430	120	230	-	-	
						LONG	-	3180	275	390	-	-	
						ULOG	-	3980	485	510	-	-	
						MLOG / MAX	-	4820	-	-	175	60	

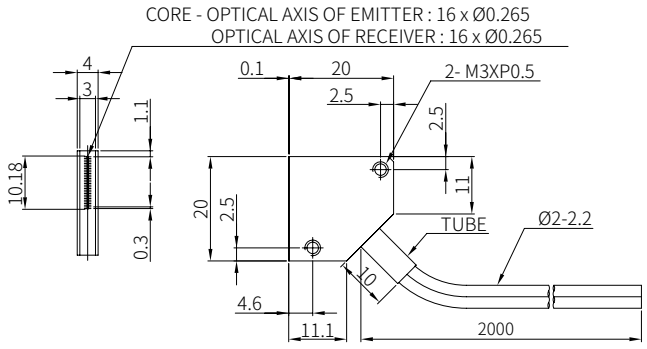
■ Dimensions

- Unit: mm (Refer to the CAD files from the Autonics website for exact dimensions)

• FDW10-320-02B



• FDW10T-320-02B



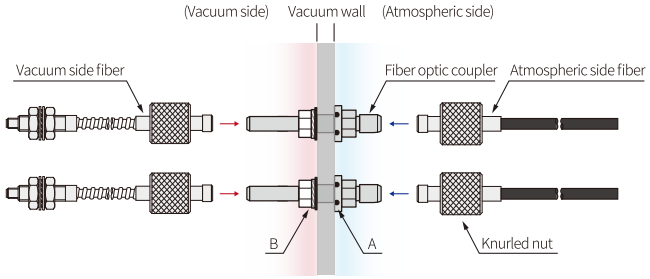
Sold Separately: Fiber Optic Coupler, Atmospheric Fiber Optic Units

■ Cautions During Installation

- When using vacuum-resistant type fiber units, be sure to use it in combination with fiber optic couplers and atmospheric fiber optic units.
- The fiber optic coupler is a device that transmits light while sealing the vacuum side from the atmospheric side. It is equipped with an O-ring. Take care when welding the vacuum chamber wall, as this may cause the internal glass rod to become cloudy.
- Consider the following conditions when installing fiber optic couplers.
  - Applicable chamber wall thickness: 8 to 10 mm
  - Mounting hole diameter: Ø 5.0 + 0.1, - 0.1 mm
  - O-ring contact surface roughness: 1.6 Ry
- Install the fiber optic coupler and fiber optic units to the connection points below. Failure to do so may result in product damage.
  - Vacuum-resistant fiber optic unit → Long end of the fiber optic coupler
  - Atmospheric fiber optic unit → Short end of the fiber optic coupler

■ Example Configuration

01. Insert the fiber optic coupler in the installation hole of the vacuum chamber wall.
02. From the long side of the fiber optic coupler towards the vacuum wall, place the flat washer, spring washer in order, then tighten the nut to secure the coupler.
03. Connect the vacuum-side and atmosphere-side fiber optic units to the coupler by turning the knurled nuts.



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

■ Fiber Optic Coupler

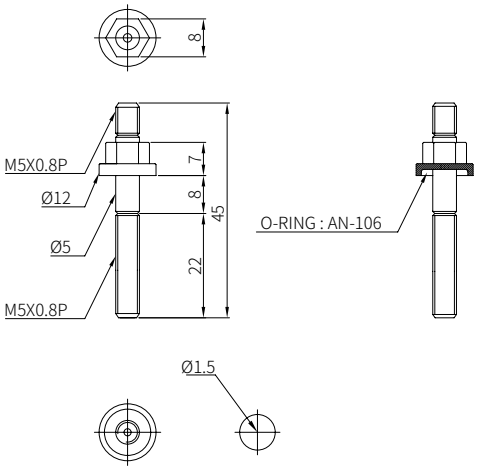
Appearance	Ambient temperature	Compatible cable types	Model
	-60 to 200 °C	Vaccum-resistant, Atmospheric	FU-VC01
	-60 to 300 °C	Vaccum-resistant, Atmospheric	FU-VC02

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

■ Dimensions

Unit: mm (Refer to the CAD files from the Autonics website for exact dimensions)

• FU-VC01, FU-VC02



■ Atmospheric Fiber Optic Units

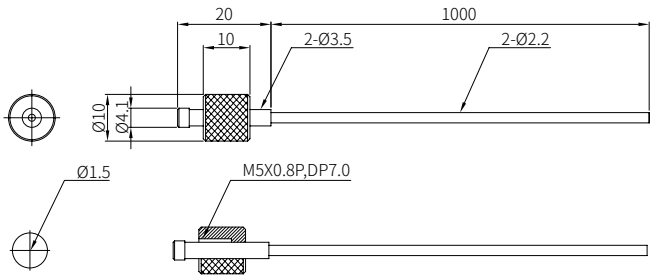
Appearance	Bend radius	Ambient temperature	FREE CUT	Model
	R30	-30 to 70 °C	FREE CUT	FU-VA01
	R20	-30 to 70 °C	FREE CUT	FU-VA02

- Product components: Atmospheric fiber optic units × 2, cable cutter (FC-3) × 1

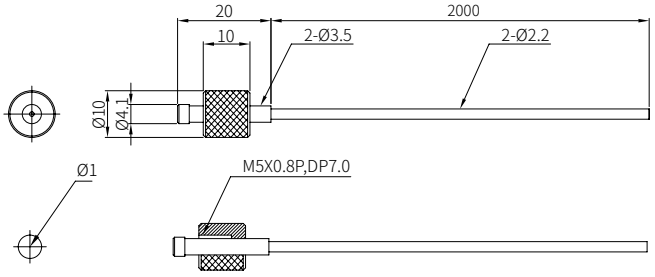
■ Dimensions

Unit: mm (Refer to the CAD files from the Autonics website for exact dimensions)

• FU-VA01

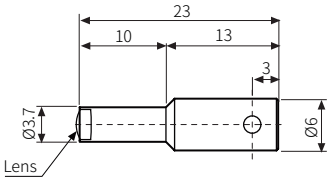


• FU-VA02

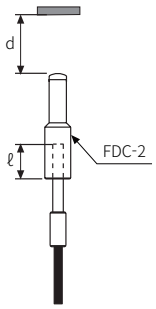
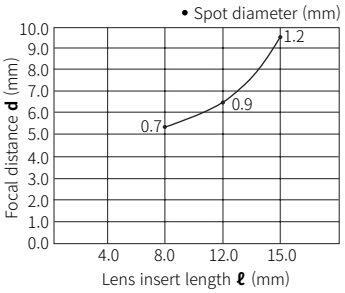


Sold Separately: Lens Unit for Micro Spot

Micro spot lens unit can be used to detect small or fine objects.
• Supported fiber optic unit: FDC-320-F

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

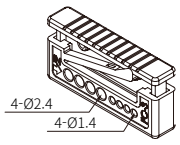
■ Characteristic Data

Measuring method	Beam spot characteristics
	

■ Sensing Distance

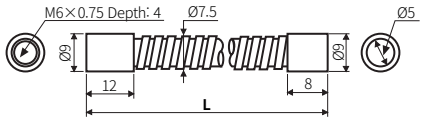
Lens insert length (ℓ)	Amp. / Mode	Sensing distance (Typical, unit: mm) BFN	BFN-D	BFX	BF5	BF4	BF3
8 mm	MFST	-	30	-	-	-	-
	UFST	5	80	6	6	-	-
	FST	20	205	8	9	-	-
	STD	40	405	12	15	-	-
	LONG	-	590	25	30	-	-
	ULOG	-	940	55	50	-	-
	MLOG / MAX	-	1320	-	-	N/A	N/A
12 mm	MFST	-	40	-	-	-	-
	UFST	10	90	5	5	-	-
	FST	30	230	10	10	-	-
	STD	50	440	15	20	-	-
	LONG	-	640	35	35	-	-
	ULOG	-	1005	75	80	-	-
	MLOG / MAX	-	1390	-	-	N/A	N/A
15 mm	MFST	-	110	-	-	-	-
	UFST	40	170	15	20	-	-
	FST	70	365	20	25	-	-
	STD	120	725	35	45	-	-
	LONG	-	1055	70	85	-	-
	ULOG	-	1550	140	135	-	-
	MLOG / MAX	-	2240	-	-	N/A	N/A

Sold Separately: Cable Cutter

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

Sold Separately: Cable Protection Tube

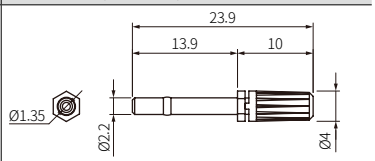
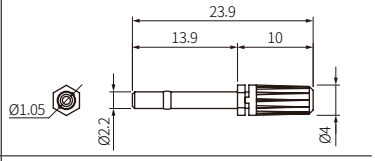
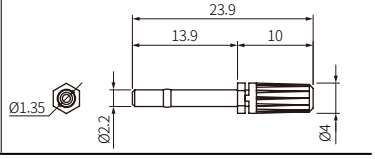
Select the appropriate cable protection tube considering the diameter of the fiber optic unit.
• Cable diameter size: Cable protection tube > Fiber optic unit

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

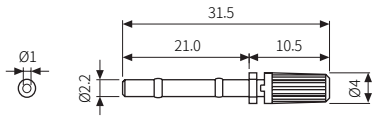
Sold Separately: Adapter

For adapter-compatible models (●), the adapter is supported only with the BFN, BFX, BF5, and BF4 Series fiber optic amplifiers.
The adapter can be purchased separately through our authorized distributors.
For the BF3 series, the adapter needs to be purchased separately.

■ Adapter compatible with BFN, BFX, BF5, and BF4 Series

Model	Features	Qty	Dimensions (unit: mm)
BFN-ADAPTER-13	Inner diameter: Ø1.3 Color: Dark gray	2	
BFN-ADAPTER-1013	Inner diameter: Ø1 Color: Black	1	
	Inner diameter: Ø1.3 Color: Dark gray	1	

■ Adapter compatible with BF3 Series

Model	Features	Dimensions (unit: mm)
H1750000134	Inner diameter: Ø1 Color: Black	
B1700000046	Inner diameter: Ø1.3 Color: Dark gray	