

Fiber Unit Selection Guide

HPF Series



azbil

No-worry small part pass-through detection

Fiber for Small Part Passage Detection

HPF-T047

Reliable detection even through pipe wall.

Ultra-light—only 12 g

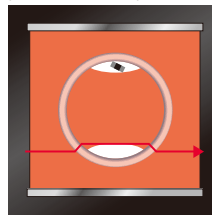
Fiber elements are highly tolerant of bending, for use with moving equipment.

Cables lead-out is in the same direction as the pipe, for tight installation spaces.

Swapping attachments adjusts the area width to match the pipe diameter.

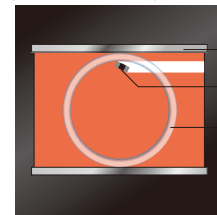
Attachment suitable for the pipe diameter improves detection stability.

(No attachment)



There is an unstable detection area at the pipe rim due to light refraction.

(With attachment)



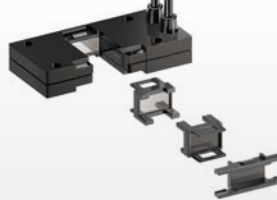
Use of a reflector matching the pipe diameter achieves reliable detection even at the rim.

Reflector
Target object
Pipe

12 mm wide



6 mm wide



Swapping attachments easily gives the optimal area width.

HPF-T047 [specialized use] ▶ P31

No worries about air bubbles or liquid color changes

Pipe-Mounted Liquid Level Fiber

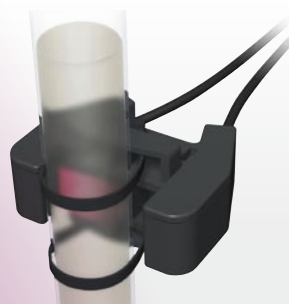
HPF-T032·T032E

HPF-T034·T034E

HPF-T032, T032E
Light received when liquid present



HPF-T034, T034E:
Light received when liquid absent



Operating principle of HPF-T032 and T032E

Liquid present	Liquid absent
Light received Light emitted	(When pipe contains air bubbles or is clouded.) Light received Light emitted

Clouding and bubbles reduce the level of received light, so it is reassuring that the risk of false detection (light = liquid present) does not increase.

Operating principle of HPF-T034 and T034E

Liquid present	Liquid absent
(Colorless liquid) Light received Light emitted (Whitish liquid) Light received Light emitted	Light received Light emitted

Light is blocked when liquid is present, which prevents false detection due to a change in the liquid's color.

HPF-T032·T032E,
HPF-T034·T034E [specialized use] ▶ P32

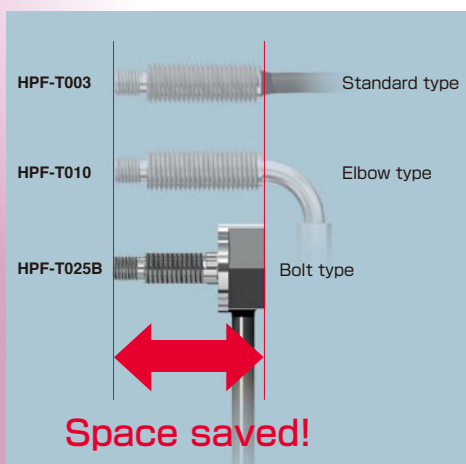
Make full use of limited installation space

Bolt-type Fiber

Thru scan: **HPF-T025B**

Coaxial diffuse scan: **HPF-D032B**

Can save significantly more space than previous types. Problem of accidentally hooking cables is greatly reduced.



Selectable installation methods

Attach with a nut



Attach with the setscrew



Flexible installation with either nut or setscrew, for a variety of operation and space requirements.

HPF-T025B [screw] ▶ P7

HPF-D032B [coaxial] ▶ P13

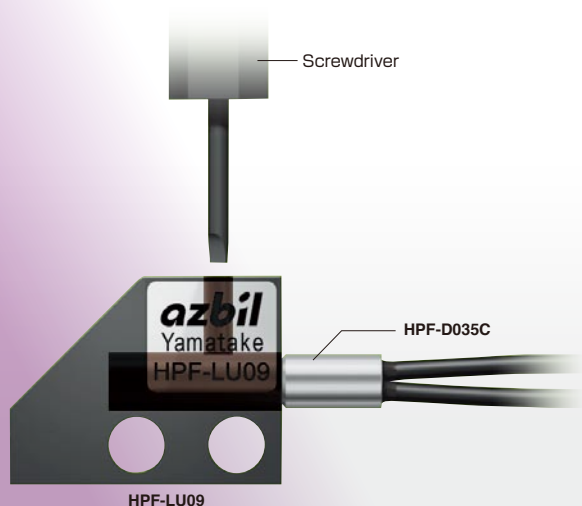
Desired spot diameter easily achieved

Variable Spot Lens Unit

Lens unit: **HPF-LU09**

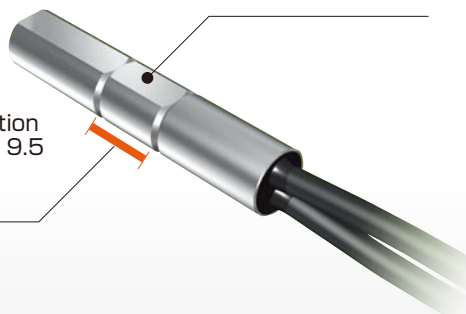
Coaxial diffuse scan: **HPF-D035C**

No need to turn the fiber unit to change spot diameters. Affix the fiber to the lens using the setscrew (supplied).



Grooves mark minimum and maximum insertion points of 6 and 9.5 mm, to guide adjustment.

Area that attaches to the lens unit is cut in a D-shape.



HPF-LU09 [lens unit] ▶ P33

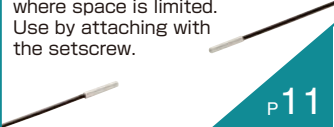
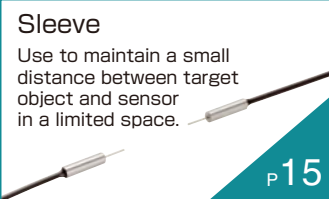
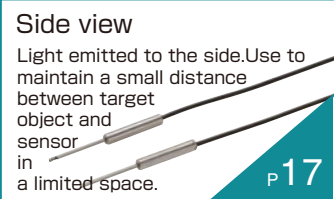
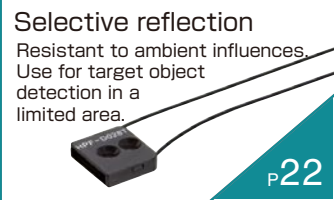
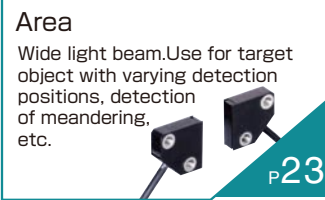
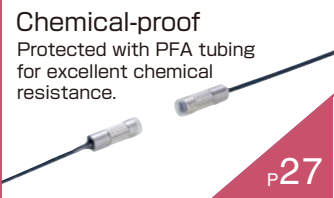
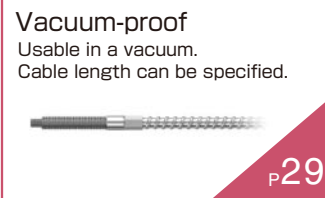
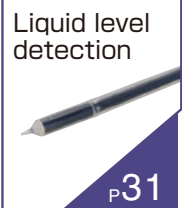
HPF-D035C [coaxial] ▶ P13

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model number

Search by type or application

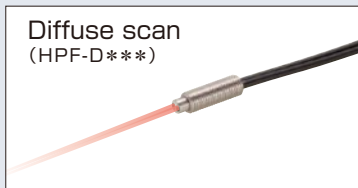
Select by shape or optical type	Screw Most generally used. Use by attaching to a bracket, etc.  P7	Cylindrical Suitable for installation where space is limited. Use by attaching with the setscrew.  P11	Coaxial Used for target object positioning or in combination with spot lenses.  P13			
	Sleeve Use to maintain a small distance between target object and sensor in a limited space.  P15	Side view Light emitted to the side. Use to maintain a small distance between target object and sensor in a limited space.  P17	Narrow view Light spread minimized. Use in a place where light intrusion is undesirable.  P19			
	Flat Suitable for installation where space is limited. Attach directly to casing.  P21	Selective reflection Resistant to ambient influences. Use for target object detection in a limited area.  P22	Area Wide light beam. Use for target object with varying detection positions, detection of meandering, etc.  P23			
Select by environment	Heatproof Resistant to high temperatures. Use in environments up to 350 °C.  P25	Chemical-proof Protected with PFA tubing for excellent chemical resistance.  P27	Vacuum-proof Usable in a vacuum. Cable length can be specified.  P29			
	Select by application	Passing chip detection  P31	Liquid level detection  P31	Liquid level detection  P32	Liquid leak detection  P32	Accessories

Search by model number

Thru scan
(HPF-T***)



Diffuse scan
(HPF-D***)



Lens unit accessory



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HPX-	
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Screw

Cylindrical

Coaxial

Sleeve

Side view

Narrow view

Flat/
Selective
reflection

Area

Heatproof

Chemical
-proof

Vacuum
-proof

Specialized
Use

Lens unit

Accessory

Technical
Guide

List of Scanning
Distance by
Amplifier Model

Introducing: Combination Amplifiers

High performance-Advanced functions

HPX-AG series

<Exterior view>



<Operation panel>



Typical models

Type	Model number
Standard	HPX-AG00-1S
Space-saving (main unit)	HPX-AG00-3S
Space-saving (expansion unit)	HPX-AG00-5S

Double digital display
High-sensitivity, ultra-long distance detection
Multifunctional models
(Alarm output, differential output, two outputs, databank, etc.)

<Standards compliance>



Standard

HPX-EG series

<Exterior view>



<Operation panel>



Typical models

Type	Model number
Standard	HPX-AG00-1S
Space-saving (main unit)	HPX-AG00-3S
Space-saving (expansion unit)	HPX-AG00-5S

Double digital display
Built for usability
(Sensitivity auto-change function, threshold value tracking function)

<Standards compliance>



Certification pending,
Sept. 2010

Volume

HPX-A series HPX-H series

<Exterior view>



<Operation panel>



Typical models

Type	Model number
Low hysteresis	HPX-A1
High sensitivity	HPX-H1

Sensitivity adjuster with indicator
Self-diagnostic display (output)
Slim 10 mm profile

<Standards compliance>



Introducing: Fiber Customization Services

► Change the cable length

If fiber length is insufficient, you can specify a cable length.

<Example model number>

HPF-T001-L05

Base model number

L02: Fiber length 2 m

L05: Fiber length 5 m

L10: Fiber length 10 m

■ Price: Determined by quantity

■ Qty: No minimum (1 cable or more)

*For details on the scanning distances with a different cable length, see the Technical Guide (page 39).

*The cable cannot be lengthened on some models. For details, please contact our sales staff.

► Change the sleeve length

A range of on-site services are available, such as emergency sensor additions and changes, and sample production evaluation.

■ Applicable models

Thru scan	Diffuse scan
HPF-T005	HPF-D003
HPF-T015	HPF-D006
HPF-T037	HPF-D011

■ Example model number

For an HPF-T005 with a 120 mm sleeve and 5 m fiber unit cable

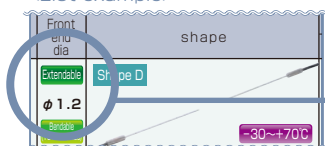
HPF-T005-S120L05 is the model number.

The standard (base) model No.

"S" + 3-digit sleeve length.

Cable length. This can be omitted if length is standard.

<List example>



For specification details, see ► P15 / P17

Customizable models have this label.

■ Price: Determined by quantity

■ Delivery: One week (up to 10 cables)

■ Quantity: No minimum (1 cable or more)

Introducing: Element Types

Material of element

Plastic

Performance/Feature

- General-purpose** Bend radius 5-25
- Bend tolerant** Bend radius 4
- Unbreakable** Bend radius 1-2
- Heatproof** Two types, 105°C and 150°C

Multi-component glass

- Heatproof** Two types, 200°C and 350°C
- Vacuum** 350°C

<List example>

Cable		Amp model No.	M
Bend radius	Length		
R1	2m	HPX-AG	
Unbreakable	Free cut	HPX-EG	
		HPX-F	
		HPX-A	

Indicates element type.

■ Bend-tolerant fiber unit [R4]

For use in moving environments



■ Cyclic bending test (reference)

Bent ±90°

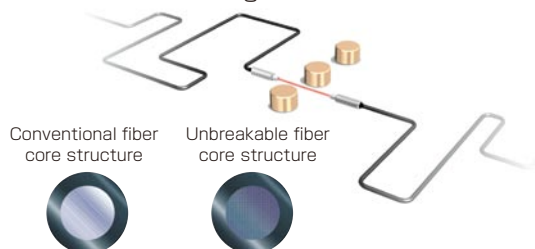
[Measurement conditions]
Roller diameter: 8 mm (4 mm in radius)
Load: 500 g

For example, HPF-T008 and -T009 withstand 1,000,000 bends under these conditions without breaking.

■ Unbreakable fiber unit (stationary bend type) [R1/R2]

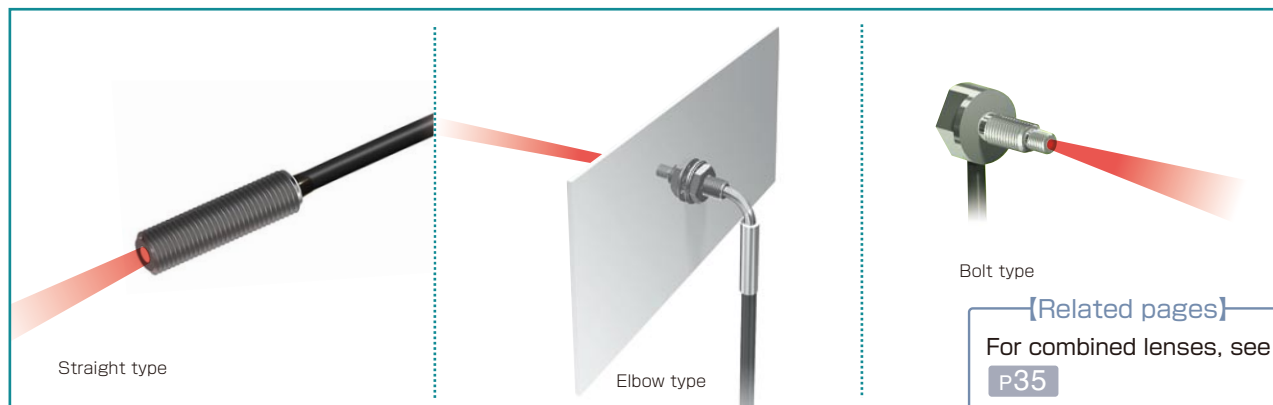
Even if the cable is bent at a small radius, the light level does not change.

Thanks to multi-core structure bundling several 100s of fiber elements, bending the cable does not attenuate the light level.



Screw Thru scan

Most generally used.
Use by attaching to a bracket, etc.

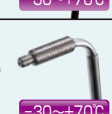
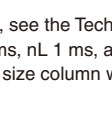


[\[Related pages\]](#)

For combined lenses, see
P35

For diffuse scan type,
see page 9.

Thru scan

Type	Size	Shape	Cable		Scanning distance (mm)			Core	Min. detectable size (mm)	Model No.
			Bend radius	Length	Amp model No.	Mode	Distance			
Straight	M3	Shape A 	R1	2m	Unbreakable	Free cut	HPX-AG HP FT 140	φ0.5	φ0.005	HPF-T024
							HPX-EG nL FT 50			
							HPX-H FT 50			
		Shape B 	R4	2m	Bend tolerant	Free cut	HPX-AG HP FT 180			
							HPX-EG nL FT 52			
							HPX-H FT 60			
	M4	Shape C 	R20	2m	Free cut	Free cut	HPX-AG HP FT 350	4×φ0.25	φ0.01	HPF-T008
							HPX-EG nL FT 410			
							HPX-H FT 240			
		Shape D 	R20	2m	Free cut	Free cut	HPX-AG HP FT 195			
							HPX-EG nL FT 220			
							HPX-H FT 130			
Bolt	M4	Shape D 	R2	2m	Unbreakable	Free cut	HPX-AG HP FT 900	φ1.0	φ0.005	HPF-T025
							HPX-EG nL FT 260			
							HPX-H FT 310			
		Shape D 	R20	2m	Free cut	Free cut	HPX-AG HP FT 350			
							HPX-EG nL FT 410			
							HPX-H FT 240			
Elbow	M4	Shape D 	R20	2m	Free cut	Free cut	HPX-AG HP FT 630	φ1.4	φ0.01	HPF-T001
							HPX-EG nL FT 770			
							HPX-H FT 450			
		Shape D 	R4	2m	Bend tolerant	Free cut	HPX-AG HP FT 900			
							HPX-EG nL FT 260			
							HPX-H FT 280			
Bolt	M4	Shape E 	R2	2m	Unbreakable	Free cut	HPX-AG HP FT 900	φ1.0	φ0.005	HPF-T025B
							HPX-EG nL FT 260			
							HPX-H FT 310			
		Shape F 	R20	2m	Free cut	Free cut	HPX-AG HP FT 855			
							HPX-EG nL FT 245			
							HPX-H FT 300			

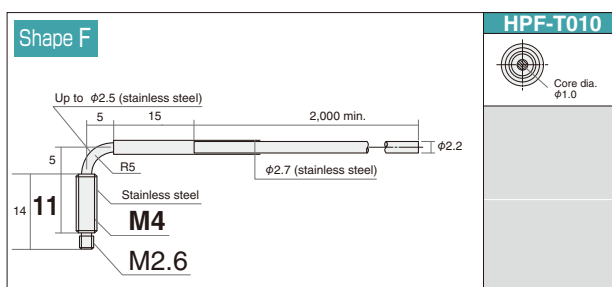
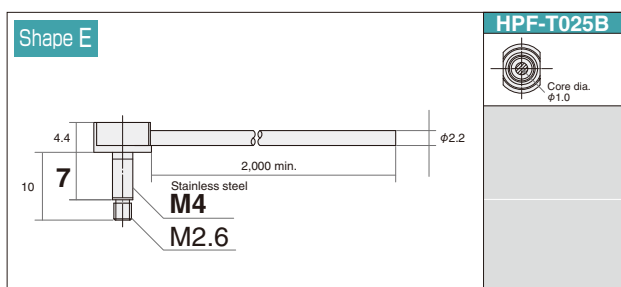
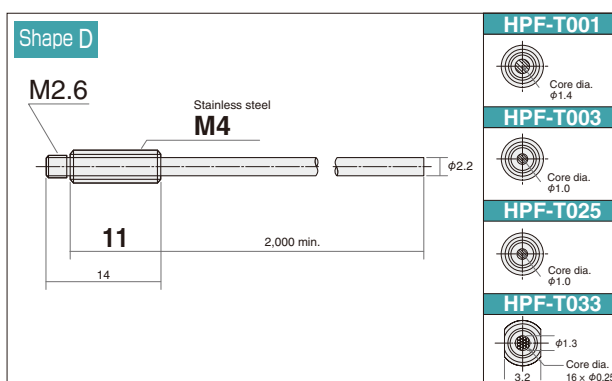
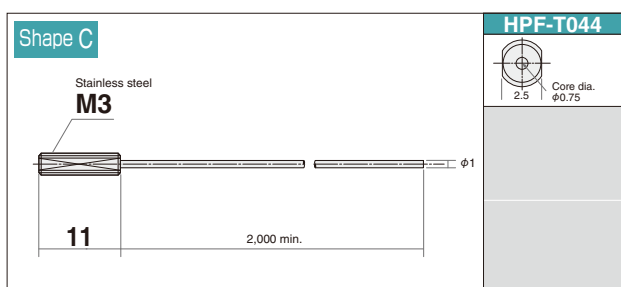
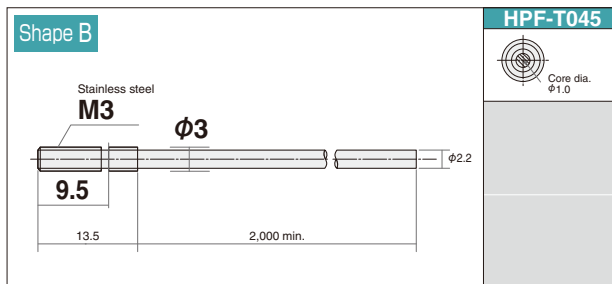
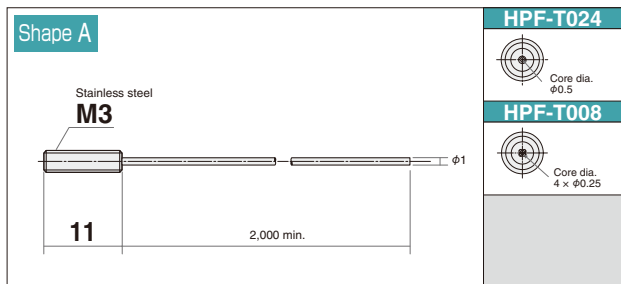
*For scanning distances of the sensing modes, see the Technical Guide (page 41).

*Response times for the sensing types: HP 5 ms, nL 1 ms, and FT 250 μs.

*The values shown in the Minimum detectable size column were obtained with optimal scanning distance and sensitivity settings (HPX-AG).

Outer dimensions

Unit: mm



NOTEWORTHY

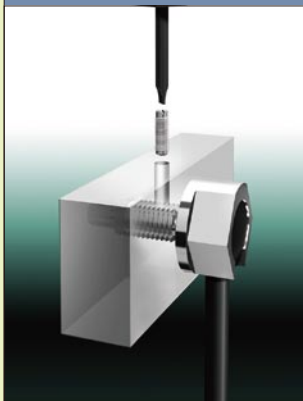
Products allowing either nut or setscrew installation are available for flexible operability, maintenance parts consolidation, and other factors.

HPF-T025B

Nut installation



Setscrew installation



Attachment method selectable

◇Applicable model number

Thru scan	Straight	HPF-T033
Thru scan	Straight	HPF-T044
Thru scan	Bolt	HPF-T025B



Screw

Cylindrical

Coaxial

Sleeve

Side view

Narrow view

Flat/
Selective
reflection

Area

Heatproof

Chemical
-proof

Vacuum
-proof

Specialized
Use

Lens unit

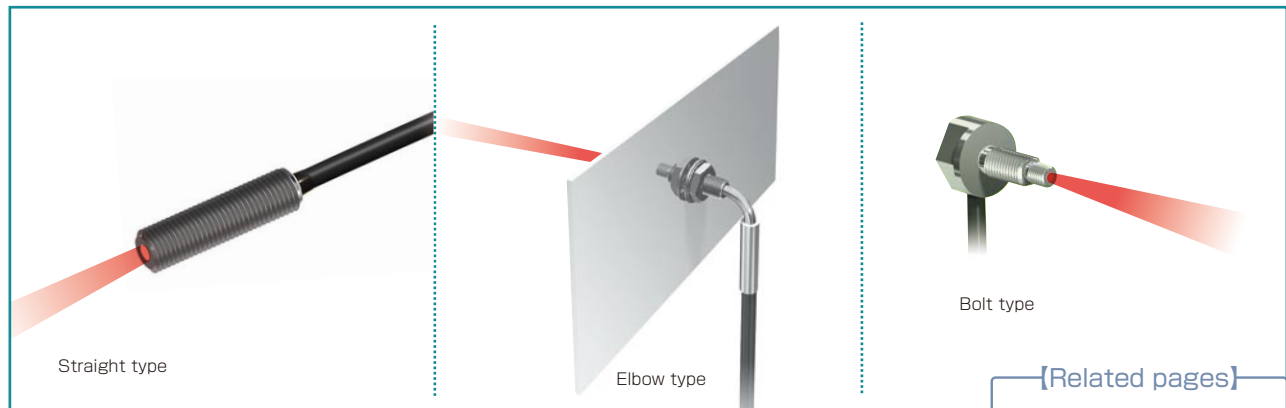
Accessory

Technical
Guide

List of Scanning
Distance by
Amplifier Model

Screw Diffuse scan

Most generally used.
Use by attaching to a bracket, etc.



Diffuse scan

Type	Size	Shape	Cable		Scanning distance (mm)			Core	Min. detectable size (mm)	Model No.
			Bend radius	Length	Amp model No.	Mode	Distance			
Straight	M3	Shape G	R1	2m	Unbreakable	Free cut	HPX-AG HP 25	Receiver and emitter $\phi 0.5$	$\phi 0.005$	HPF-D029
							FT 8			
							HPX-EG nL 10			
		Shape H	R15	2m	Free cut	Free cut	FT 5	Receiver and emitter $\phi 0.5$	$\phi 0.005$	HPF-D004
							HPX-H 10			
							HPX-A 5			
	M4	Shape I	R4	2m	Bend tolerant	Free cut	HPX-AG HP 20	Receiver and emitter $2 \times \phi 0.25$	$\phi 0.005$	HPF-D037
							FT 6			
							HPX-EG nL 8			
		Shape J	R15	2m	Free cut	Free cut	FT 5	Receiver and emitter $\phi 0.75$	$\phi 0.005$	HPF-D018
							HPX-H 8			
							HPX-A 4			
	M4	Shape I	R2	2m	Unbreakable	Free cut	HPX-AG HP 65	Receiver and emitter $\phi 1.0$	$\phi 0.005$	HPF-D030
							FT 200			
							HPX-EG nL 75			
	M4	Shape J	R4	2m	Bend tolerant	Free cut	FT 46	Receiver and emitter $16 \times \phi 0.25$	$\phi 0.005$	HPF-D012
							HPX-H 80			
							HPX-A 40			
	M4	Shape I	R20	2m	Free cut	Free cut	HPX-AG HP 210	Receiver and emitter $\phi 1.4$	$\phi 0.005$	HPF-D001
							FT 69			
							HPX-EG nL 85			
	M4	Shape J	R20	2m	Free cut	Free cut	FT 50	Receiver and emitter $\phi 1.0$	$\phi 0.005$	HPF-D002
							HPX-H 80			
							HPX-A 40			

*For scanning distances of the sensing modes, see the Technical Guide (page 42).

*Scanning distances for diffuse scan are obtained with a standard target object (plain white paper).

*Response times for the sensing types: HP 5 ms, nL 1 ms, and FT 250 μ s.

*The values shown in the Minimum detectable size column were obtained with optimal scanning distance and sensitivity settings (HPX-AG).

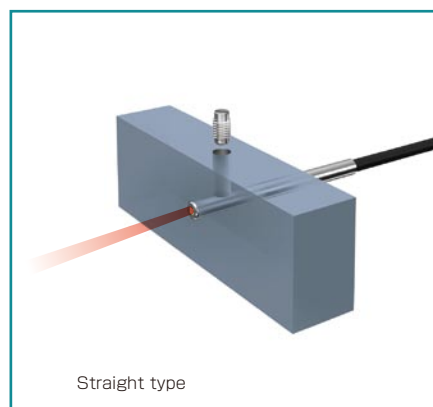
Outer dimensions

Unit: mm

Shape G	HPF-D004 Core dia. 2 x ϕ0.5 HPF-D029 Core dia. 2 x ϕ0.5
Shape H	HPF-D037 Emitter core dia.: 2 x ϕ0.25 Receiver core dia.: 2 x ϕ0.25
Shape I	HPF-D018 Dummy: 2 x ϕ0.5 Core dia. 2 x ϕ0.75
Shape J	HPF-D001 Core dia. 2 x ϕ1.4 HPF-D002 Core dia. 2 x ϕ1.0 HPF-D012 Emitter core dia.: 16 x ϕ0.25 Receiver core dia.: 16 x ϕ0.25 HPF-D030 Core dia. 2 x ϕ1.0

Cylindrical

Suitable for installation where space is limited.
Use by attaching with the setscrew.



【Related pages】

Side-view sensors

P17

Compatible lenses

P35

For head dia. of less than $\phi 1.0$ mm (thru scan) or $\phi 1.5$ mm (diffuse scan), select from sleeve-type sensors.

P15

Thru scan

Diffuse scan

Type	Size	Shape	Cable		Scanning distance (mm)		Core	Min. detectable size (mm)	Model No.
			Bend radius	Length	Amp model No.	Mode Distance			
Straight	$\phi 1$	Shape A	R15	0.5m	HPX-AG	HP 37 FT 10	$\phi 0.25$	$\phi 0.005$	HPF-T038
					HPX-EG	nL 12 FT 7			
					HPX-H	12			
					HPX-A	6			
	$\phi 1.5$	Shape B	R4	2m	HPX-AG	HP 180 FT 52	$4 \times \phi 0.25$	$\phi 0.01$	HPF-T009
					HPX-EG	nL 60 FT 38			
					HPX-H	100			
					HPX-A	40			
	$\phi 1.5$	Shape C	R4	2m	HPX-AG	HP 180 FT 52	$4 \times \phi 0.25$	$\phi 0.01$	HPF-T046
					HPX-EG	nL 60 FT 38			
					HPX-H	100			
					HPX-A	40			
	$\phi 1.5$	Shape D	R4	0.5m	HPX-AG	HP 18 FT 5	$\phi 0.125$	$\phi 0.005$	HPF-T036
					HPX-EG	nL 6 FT 3			
					HPX-H	6			
					HPX-A	3			
	$\phi 2$	Shape E	R15	2m	HPX-AG	HP 300 FT 85	$\phi 0.5$	$\phi 0.005$	HPF-T043
					HPX-EG	nL 100 FT 55			
					HPX-H	100			
					HPX-A	50			
	$\phi 3$	Shape F	R2	2m	HPX-AG	HP 900 FT 260	$\phi 1.0$	$\phi 0.005$	HPF-T031
					HPX-EG	nL 310 FT 180			
					HPX-H	300			
					HPX-A	150			
		Shape G	R20	2m	HPX-AG	HP 1,200 FT 350	$\phi 1.0$	$\phi 0.005$	HPF-T004
					HPX-EG	nL 410 FT 240			
					HPX-H	400			
					HPX-A	200			
	$\phi 3$	Shape G	R20	2m	HPX-AG	HP 2,175 FT 630	$\phi 1.4$	$\phi 0.01$	HPF-T002
					HPX-EG	nL 770 FT 450			
					HPX-H	800			
					HPX-A	400			
Straight	$\phi 1.5$	Shape H	R4	1m	HPX-AG	HP 20 FT 6	Receiver and emitter $2 \times \phi 0.25$	$\phi 0.005$	HPF-D036
					HPX-EG	nL 8 FT 5			
					HPX-H	8			
					HPX-A	4			
	$\phi 3$	Shape I	R5	2m	HPX-AG	HP 210 FT 69	Receiver and emitter $\phi 1.0$	$\phi 0.005$	HPF-D044
					HPX-EG	nL 85 FT 50			
					HPX-H	80			
					HPX-A	40			
	$\phi 3$	Shape J	R15	2m	HPX-AG	HP 105 FT 34	Receiver and emitter $\phi 0.5$	$\phi 0.005$	HPF-D005
					HPX-EG	nL 43 FT 25			
					HPX-H	40			
					HPX-A	20			

*For scanning distances of the sensing modes, see the Technical Guide (page 41).

*Scanning distances for diffuse scan are obtained with a standard target object (plain white paper).

*Response times for the sensing types: HP 5 ms, nL 1 ms, and FT 250 μ s.

*The values shown in the Minimum detectable size column were obtained with optimal scanning distance and sensitivity settings (HPX-AG).

Outer dimensions

Unit: mm

Shape A 	HPF-T038
Shape B 	HPF-T009
Shape C 	HPF-T046
Shape D 	HPF-T036
Shape E 	HPF-T043
Shape F 	HPF-T031
Shape G 	HPF-T004 HPF-T002
Shape H 	HPF-D036
Shape I 	HPF-D044
Shape J 	HPF-D005

NOTEWORTHY

Smallest fiber unit head dia. (1.0 mm) in the industry

HPF-T038



Compatible lens units are available for cylindrical types

FE-PA-L1(For long distance and narrow beam types)

FE-PA-S1(For side view types)

HPF-T004

Screw

Cylindrical

Coaxial

Sleeve

Side view

Narrow view

Flat/
Selective
reflection

Area

Heatproof

Chemical
-proof

Vacuum
-proof

Specialized
Use

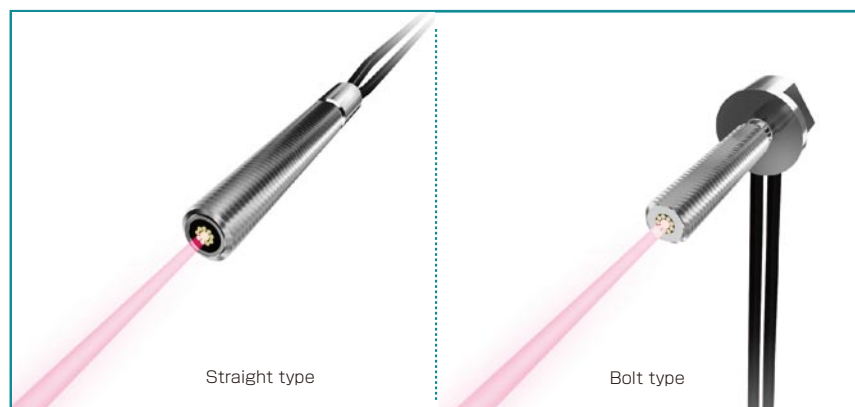
Lens unit

Accessory

Technical
Guide

List of Scanning
Distance by
Amplifier Model

Used for target object positioning or in combination with spot lenses.



[\[Related pages\]](#)

For compatible micro-spot lenses

P33

Diffuse scan

Type	Size	Shape	Cable		Scanning distance (mm)		Core	Min. detectable size (mm)	Model No.
			Bend radius	Length	Amp model No.	Mode			
Straight	M3	Shape A Lens attachable -30~+70°C	R4 Bend tolerant	0.5m	HPX-AG HPX-EG HPX-H HPX-A	HP FT	60 19	Emitter: φ0.25 Receiver: 6×φ0.25	φ0.005 HPF-D034
						nL	25		
						FT	15		
						FT	25		
		Shape B Lens attachable -30~+70°C	Emitter: R1 Receiver: R4 Unbreakable	2m	HPX-AG HPX-EG HPX-H HPX-A	HP FT	46 15	Emitter: φ0.5 Receiver: 4×φ0.25	φ0.005 HPF-D032
						nL	18		
						FT	10		
						FT	18		
		Shape C Lens attachable -30~+70°C	R15 Free cut	2m	HPX-AG HPX-EG HPX-H HPX-A	HP FT	86 28	Emitter: φ0.5 Receiver: 4×φ0.25	φ0.005 HPF-D010
						nL	35		
						FT	21		
						FT	40		
Bolt	M3	Shape D Lens attachable -30~+70°C	Emitter: R1 Receiver: R4 Unbreakable	1m	HPX-AG HPX-EG HPX-H HPX-A	HP FT	46 15	Emitter: φ0.5 Receiver: 4×φ0.25	φ0.005 NEW HPF-D032B
						nL	18		
Straight	M4	Shape E -30~+70°C	R15 Free cut	2m	HPX-AG HPX-EG HPX-H HPX-A	HP FT	95 43	Emitter: φ0.5 Receiver: 9×φ0.25	φ0.005 HPF-D038
						nL	50		
						FT	29		
						FT	50		
	M6	Shape F -30~+70°C	R20 Free cut	2m	HPX-AG HPX-EG HPX-H HPX-A	HP FT	400 130	Emitter: φ1.0 Receiver: 16×φ0.25	φ0.005 HPF-D009
						nL	150		
						FT	90		
						FT	150		
	φ2	Shape G -30~+70°C	R15 Free cut	2m	HPX-AG HPX-EG HPX-H HPX-A	HP FT	86 28	Emitter: φ0.5 Receiver: 4×φ0.25	φ0.005 HPF-D042
						nL	35		
						FT	21		
						FT	40		
	φ3	Shape H -30~+70°C	R15 Free cut	2m	HPX-AG HPX-EG HPX-H HPX-A	HP FT	95 43	Emitter: φ0.5 Receiver: 9×φ0.25	φ0.005 NEW HPF-D035C
						nL	50		
						FT	29		
						FT	50		

*For scanning distances of the sensing modes, see the Technical Guide (page 42).

*Scanning distances for diffuse scan are obtained with a standard target object (plain white paper).

*Response times for the sensing types: HP 5 ms, nL 1 ms, and FT 250 μs.

*The values shown in the Minimum detectable size column were obtained with optimal scanning distance and sensitivity settings (HPX-AG).

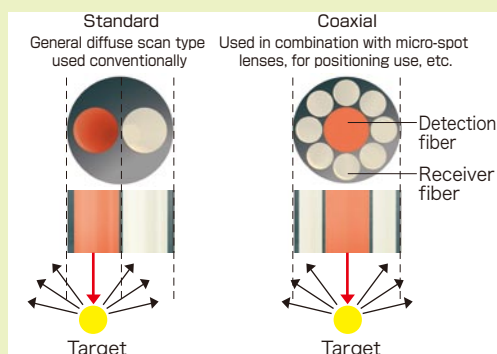
Outer dimensions

Unit: mm

Shape A 	HPF-D034 Emitter core dia.: $\phi 0.25$ Receiver core dia.: $6 \times \phi 0.25$	Shape B 	HPF-D010 Emitter core dia.: $\phi 0.5$ Receiver core dia.: $4 \times \phi 0.25$ (Dummy $5 \times \phi 0.25$) HPF-D032 Emitter core dia.: $\phi 0.5$ Receiver core dia.: $4 \times \phi 0.25$ (Dummy $5 \times \phi 0.25$)
Shape C 	HPF-D035 Emitter core dia.: $\phi 0.5$ Receiver core dia.: $9 \times \phi 0.25$	Shape D 	HPF-D032B Emitter core dia.: $\phi 0.5$ Receiver core dia.: $4 \times \phi 0.25$ (Dummy $5 \times \phi 0.25$)
Shape E 	HPF-D038 Emitter core dia.: $\phi 0.5$ Receiver core dia.: $9 \times \phi 0.25$	Shape F 	HPF-D009 Emitter core dia.: $\phi 1.0$ Receiver core dia.: $16 \times \phi 0.25$
Shape G 	HPF-D042 Emitter core dia.: $\phi 0.5$ Receiver core dia.: $\phi 0.25$	Shape H 	HPF-D035C Emitter core dia.: $\phi 0.5$ Receiver core dia.: $9 \times \phi 0.25$

NOTEWORTHY

Coaxial fiber is recommended for use with micro-spot lenses and applications requiring highly precise positioning.



Coaxial sensor application example

Chip face/back discrimination



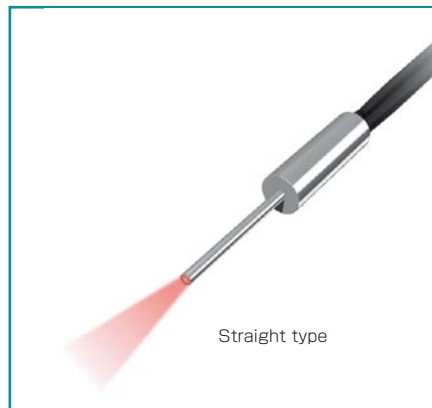
By using with a micro-spot lens, the face/back or marks of small target object can be detected.

Gold wire detection



Coaxial structure enables reliable detection of gold wires where light reflection is small.

Use to maintain a small distance between target object and sensor in a limited space.



[\[Related pages\]](#)

Sleeve-length customization

[P6](#)

Side-view sensing

[P17](#)

Thru scan

Diffuse scan

Front end dia.	Shape	Cable		Scanning distance (mm)		Core	Min. detectable size (mm)	Model No.
		Bend radius	Length	Amp. model No.	Mode			
φ 0.4	Shape A	R15	0.5m	HPX-AG	HP	18	φ 0.125	HPF-T039
					FT	5		
					nL	5		
					FT	3		
φ 0.4	Shape B	R15	2m	HPX-AG	HP	37	φ 0.25	HPF-T040
					FT	10		
					nL	12		
					FT	7		
φ 0.5	Shape C	R15	2m	HPX-H	HP	12	φ 0.25	HPF-T015
					FT	6		
					nL	12		
					FT	6		
φ 1.2	Shape D	R20	2m	HPX-AG	HP	37	φ 1.0	HPF-T005
					FT	10		
					nL	35		
					FT	21		
φ 1.2	Shape E	R20	2m	HPX-H	HP	12	φ 1.0	HPF-T006
					FT	6		
					nL	350		
					FT	200		
φ 0.82	Shape F	R4	0.5m	HPX-AG	HP	20	Receiver and emitter φ 0.25	HPF-D039
					FT	6		
					nL	4		
					FT	2		
φ 0.82	Shape G	R15	0.5m	HPX-H	HP	4	Receiver and emitter φ 0.25	HPF-D019
					FT	2		
					nL	4		
					FT	2		
φ 1.2	Shape H	R1	2m	HPX-AG	HP	25	Receiver and emitter φ 0.5	HPF-D031
					FT	8		
					nL	10		
					FT	5		
φ 1.2	Shape I	R15	2m	HPX-H	HP	10	Receiver and emitter φ 0.5	HPF-D006
					FT	5		
					nL	105		
					FT	43		
φ 1.5	Shape J	R15	2m	HPX-AG	HP	86	Receiver and emitter φ 0.5	HPF-D021
					FT	28		
					nL	35		
					FT	21		
φ 2.5	Shape K	R20	2m	HPX-H	HP	40	Receiver and emitter φ 1.0	HPF-D003
					FT	20		
					nL	400		
					FT	130		

*For scanning distances of the sensing modes, see the Technical Guide (page 41).

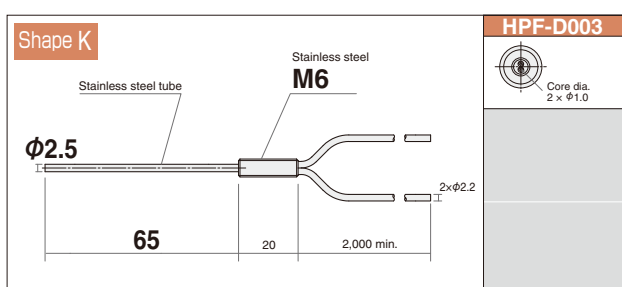
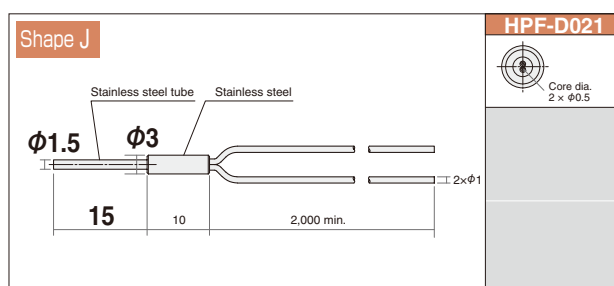
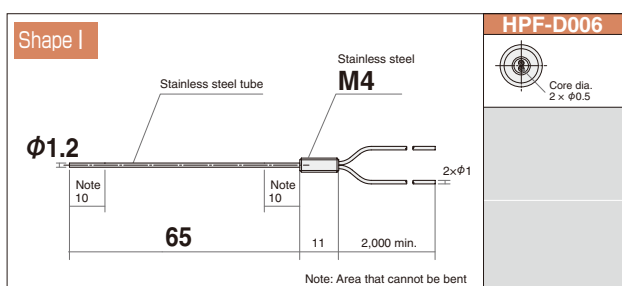
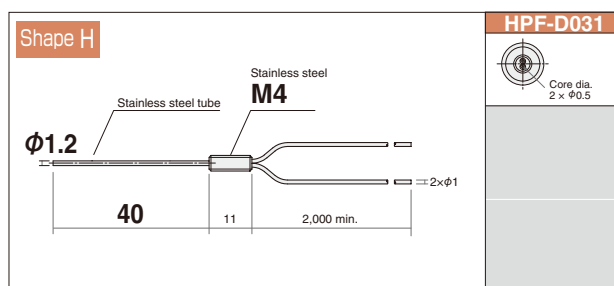
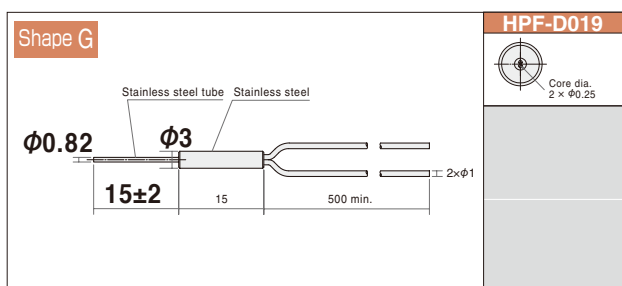
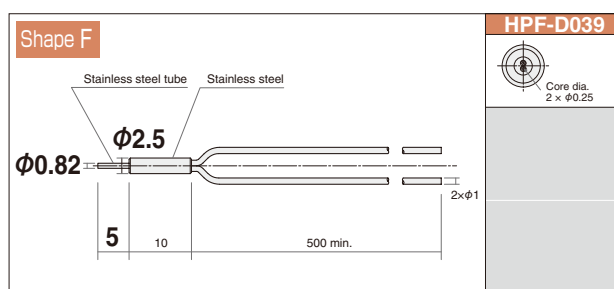
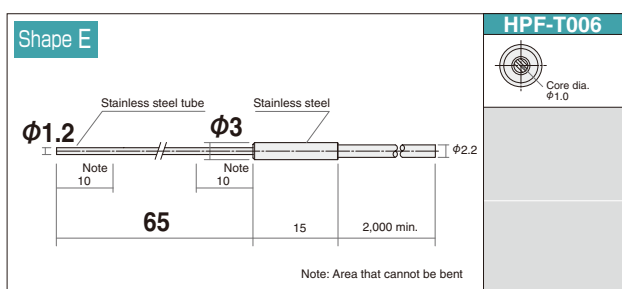
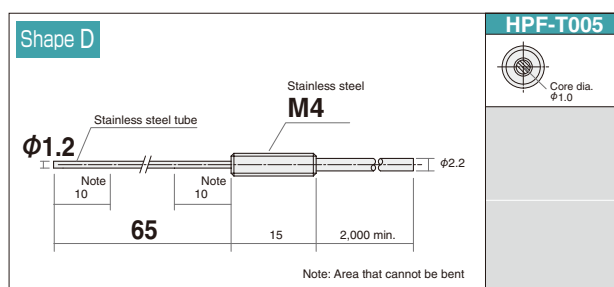
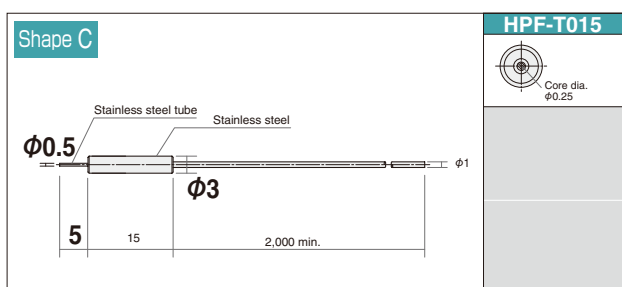
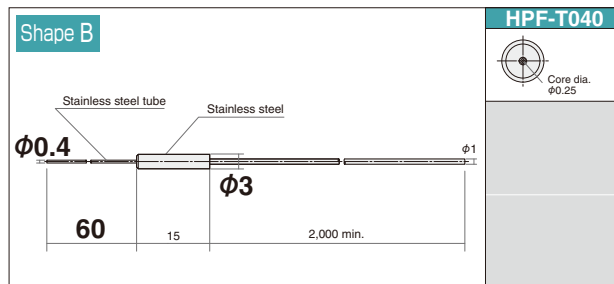
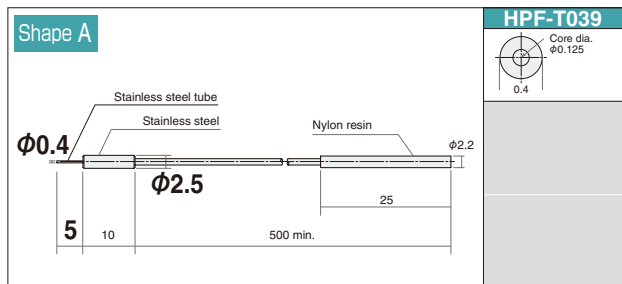
*Scanning distances for diffuse scan are obtained with a standard target object (plain white paper).

*Response times for the sensing types: HP 5 ms, nL 1 ms, and FT 250 μs.

*The values shown in the Minimum detectable size column were obtained with optimal scanning distance and sensitivity settings (HPX-AG).

Outer dimensions

Unit: mm



Screw
Cylindrical
Coaxial
Sleeve
Side view
Narrow view
Flat/ Selective reflection
Area
Heatproof
Chemical -proof
Vacuum -proof
Specialized Use
Lens unit
Accessory

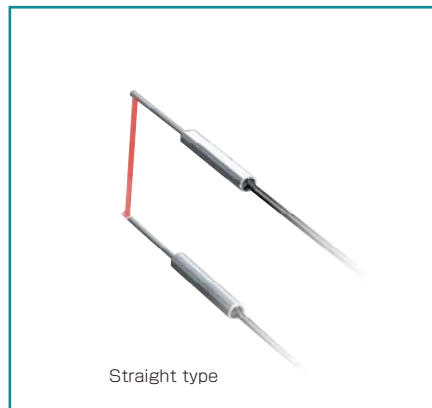
Technical
Guide

List of Scanning
Distance by
Amplifier Model

Side view

Light emitted to the side.

Use to maintain a small distance between target object and sensor in a limited space.



【Related pages】

Narrow view sensing

P19

Sleeve-length customization

P6

Thru scan

Diffuse scan

Front end dia.	Center of optical axis (From front end)	Shape	Cable		Scanning distance (mm)			Core	Min. detectable size (mm)	Model No.
			Bend radius	Length	Amp. model No.	Mode	Distance			
Extendable φ 0.88	0.6	Shape A -30~+70°C	R5	1m Free cut	HPX-AG HPX-EG HPX-H HPX-A	HP	52	φ 0.5	φ 0.005	HPF-T037
						FT	15			
						nL	20			
						FT	11			
φ 1	1.5	Shape B -30~+70°C	R1	2m Free cut	HPX-AG HPX-EG HPX-H HPX-A	HP	52	φ 0.5	φ 0.005	HPF-T026
						FT	15			
						nL	20			
						FT	11			
φ 1	1.5	Shape C -30~+70°C	R15	1m Free cut	HPX-AG HPX-EG HPX-H HPX-A	HP	165	φ 0.5	φ 0.005	HPF-T007
						FT	48			
						nL	55			
						FT	33			
φ 3	1.5	Shape D -30~+70°C	R5	2m Free cut	HPX-AG HPX-EG HPX-H HPX-A	HP	190 660	φ 0.5	φ 0.005	HPF-T042
						FT	130			
						nL	220			
						FT	120			
Extendable φ 2	1.5	Shape E -30~+70°C	R15	2m Free cut	HPX-AG HPX-EG HPX-H HPX-A	HP	40	Receiver and emitter φ 0.5	φ 0.005	HPF-D011
						FT	13			
						nL	17			
						FT	10			
φ 2	1.5	Shape F -30~+70°C	R15	2m Free cut	HPX-AG HPX-EG HPX-H HPX-A	HP	40	Receiver and emitter φ 0.5	φ 0.005	HPF-D041
						FT	13			
						nL	17			
						FT	10			
φ 6	1.5	Shape G -30~+70°C	R20	2m Free cut	HPX-AG HPX-EG HPX-H HPX-A	HP	160	Receiver and emitter φ 1.0	φ 0.005	HPF-D043
						FT	52			
						nL	65			
						FT	40			

*For scanning distances of the sensing modes, see the Technical Guide (page 41).

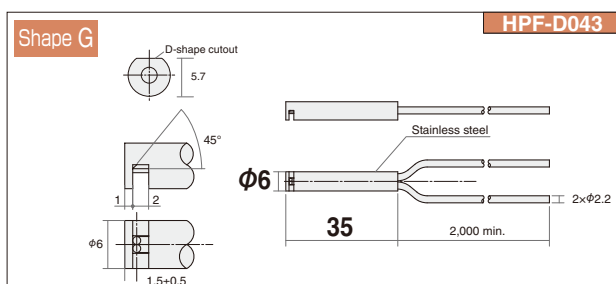
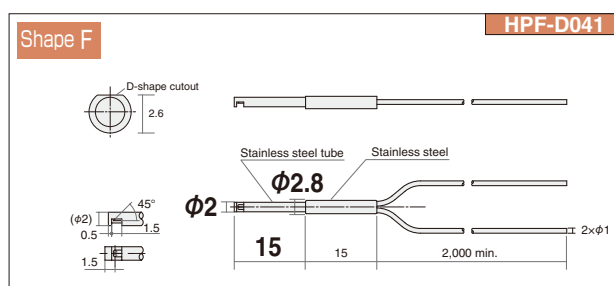
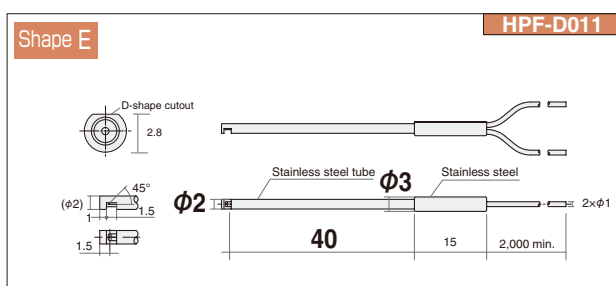
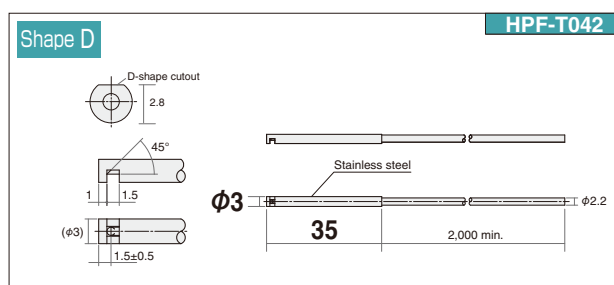
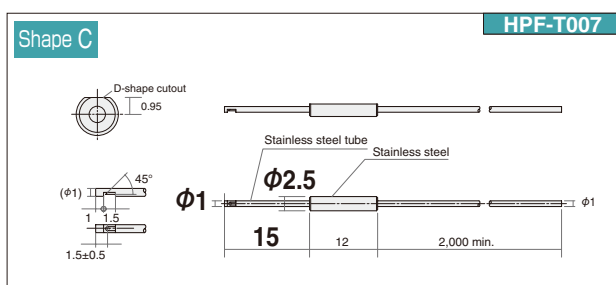
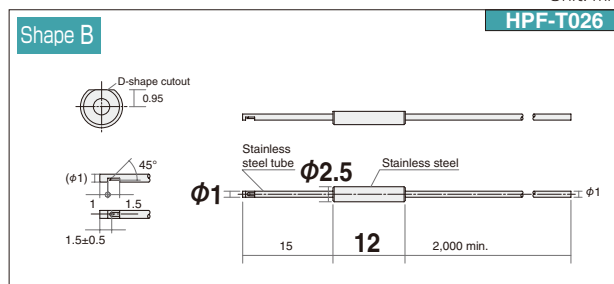
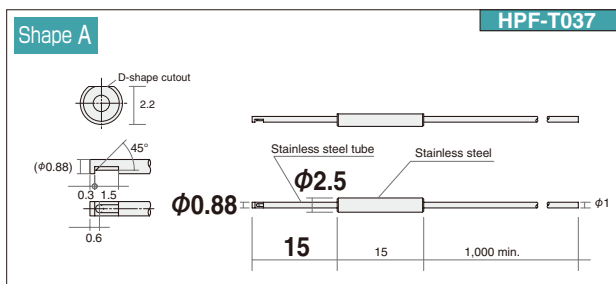
*Scanning distances for diffuse scan are obtained with a standard target object (plain white paper).

*Response times for the sensing types: HP 5 ms, nL 1 ms, and FT 250 μs.

*The values shown in the Minimum detectable size column were obtained with optimal scanning distance and sensitivity settings (HPX-AG).

Outer dimensions

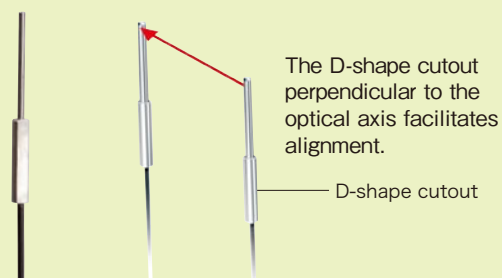
Unit: mm



NOTEWORTHY

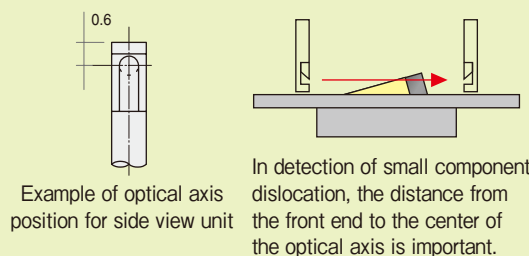
Unique feature

All side view types have D-shape cutout on the fiber unit head. This can greatly reduce adjustment man-hours during installation.



Selection point

The distance from the front end to the center of the optical axis depends on the product structure. Select the model that is suitable for your application.



Screw

Cylindrical

Coaxial

Sleeve

Side view

Narrow view

Flat/Selective reflection

Area

Heatproof

Chemical

Vacuum

Specialized

Use

Lens unit

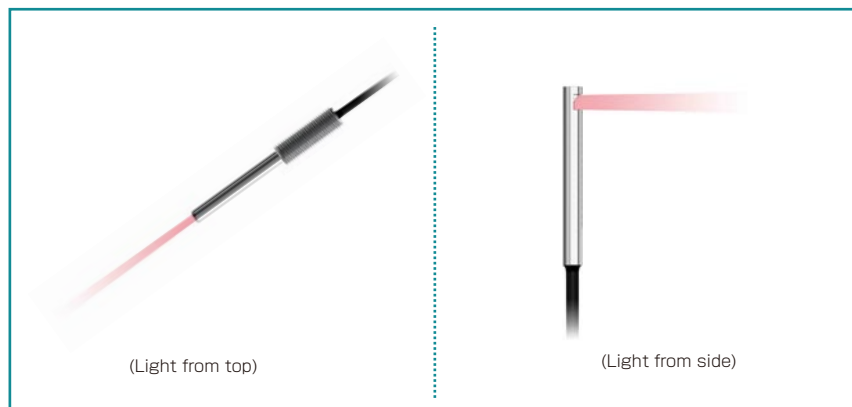
Accessory

Technical Guide

List of Scanning Distance by Amplifier Model

Narrow view

Light spread minimized.
Use in a place where light intrusion is undesirable.



【Related pages】

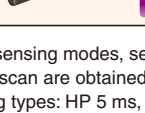
If a narrow beam is not required:

Sleeve-type units [P15](#)

Side-view units [P17](#)

Thru scan

Diffuse scan

Light emitter	Directional angle (half angle)	Shape	Cable		Scanning distance (mm)		Effective lens diameter	Min. detectable size (mm)	Model No.
			Bend radius	Length	Amp model No.	Mode Distance			
Side	1.5°	Shape A  -30~+70°C	R5	2m Free cut	HPX-AG HPX-EG HPX-H HPX-A	HP 500	φ 1.5	φ 0.005	HPF-T030
						FT 305			
						nL 310			
						FT 180			
Top	1.5°	Shape B  -30~+70°C	R15	2m Free cut	HPX-AG HPX-EG HPX-H HPX-A	HP 3,600	φ 2.0	φ 0.1	HPF-T023
						FT 1,050			
						nL 730			
						FT 1,200			
Top	2.5°	Shape C  -30~+70°C	R20	2m Free cut	HPX-AG HPX-EG HPX-H HPX-A	HP 4,100	φ 2.1	φ 0.1	HPF-T019
						FT 1,200			
						nL 1,400			
						FT 840			
Side	3°	Shape D  -30~+70°C	R20	2m Free cut	HPX-AG HPX-EG HPX-H HPX-A	HP 4,500	φ 2.6	φ 0.1	HPF-T020
						FT 1,310			
						nL 1,500			
						FT 920			
Top	—	Shape E  -30~+70°C	R15	2m Free cut	HPX-AG HPX-EG HPX-H HPX-A	HP 20	—	φ 0.005	HPF-D025
						FT 20			
						nL 28			
						FT 16			

*For scanning distances of the sensing modes, see the Technical Guide (page 41).

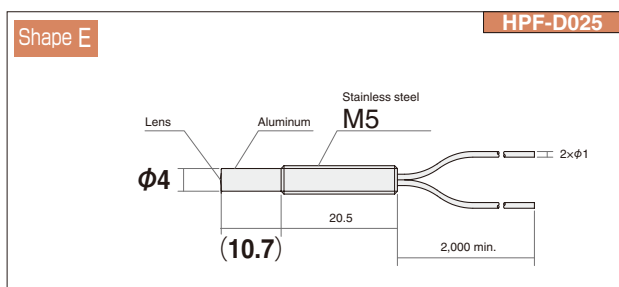
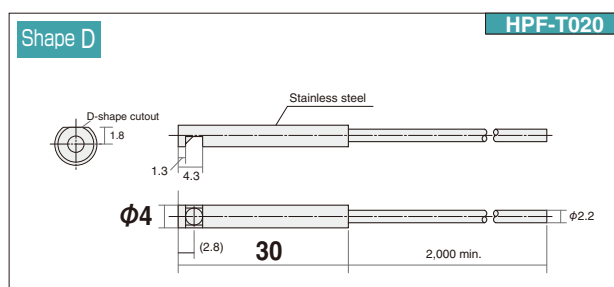
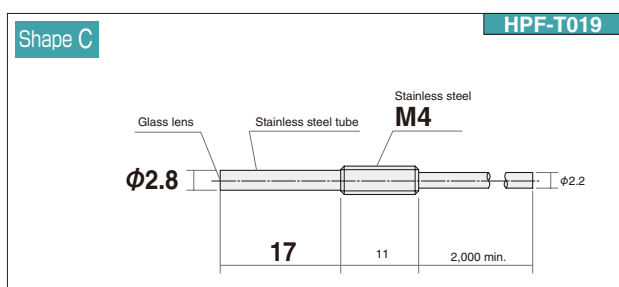
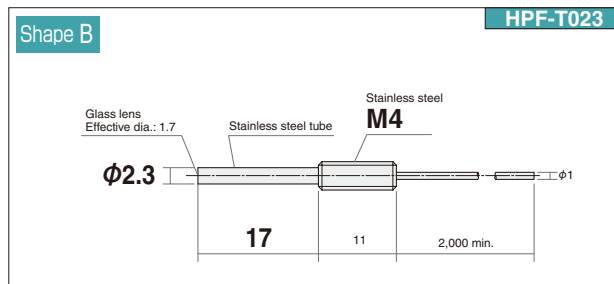
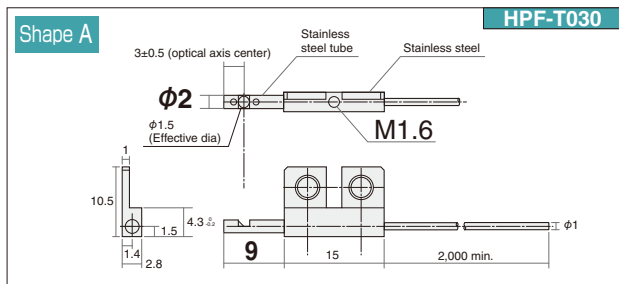
*Scanning distances for diffuse scan are obtained with a standard target object (plain white paper).

*Response times for the sensing types: HP 5 ms, nL 1 ms, and FT 250 μs.

*The values shown in the Minimum detectable size column were obtained with optimal scanning distance and sensitivity settings (HPX-AG).

Outer dimensions

Unit: mm



NOTEWORTHY

Narrow view types are available also by combination with long-distance lenses and side-view lenses.

(Typical examples)

Optical configuration	Lens unit	Fiber unit	Directional angle (half angle)
Top	FE-PA-L1	HPF-T003	Approx. 3°
Top	HPF-VL06	HPF-T003	Approx. 3°
Side	FE-PA-S1	HPF-T003	Approx. 10°
Side	HPF-VL05	HPF-T003	Approx. 8°

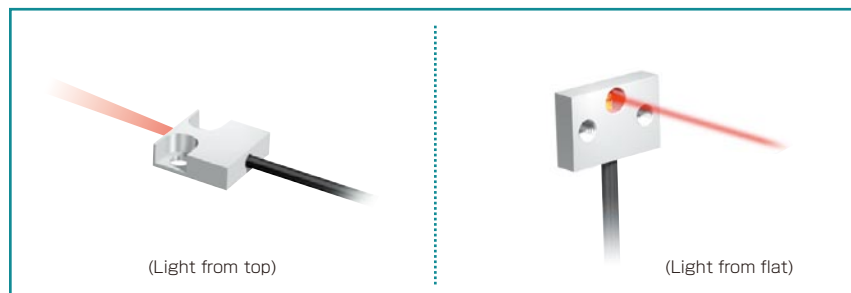
※For lens units, see page 35.

Screw
Cylindrical
Coaxial
Sleeve
Side view
Narrow view
Flat/ Selective reflection
Area
Heatproof
Chemical -proof
Vacuum -proof
Specialized Use
Lens unit
Accessory

Technical
Guide

List of Scanning
Distance by
Amplifier Model

Suitable for installation where space is limited.
Attach directly to casing.



Thru scan / Diffuse scan

Light emitter	Shape	Cable		Scanning distance (mm)		Core	Min. detectable size (mm)	Model No.
		Bend radius	Length	Amp model No.	Mode			
Top	Shape A	R1	2m	HPX-AG	HP	φ 0.5	φ 0.005	HPF-T028
					FT			
					nL			
					FT			
Flat	Shape B	R5	2m	HPX-AG	HP	φ 1.0	φ 0.005	HPF-T028LF
					FT			
					nL			
					FT			
Flat	Shape C	R2	2m	HPX-AG	HP	Receiver and emitter φ 1.0	—	HPF-D045LF
					FT			
					nL			
					FT			

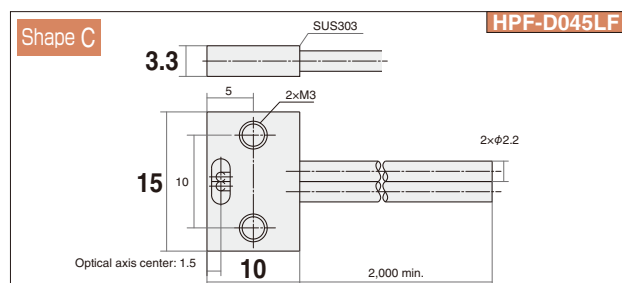
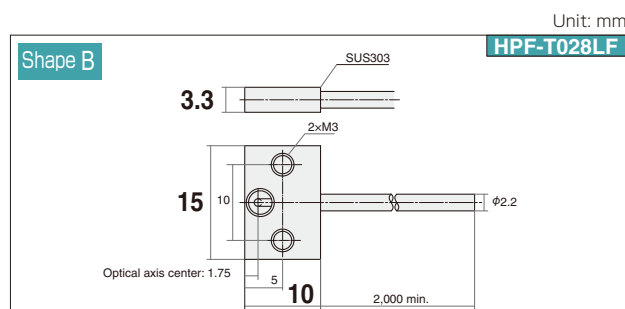
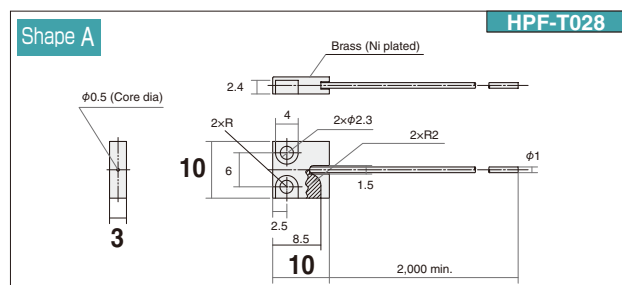
*For scanning distances of the sensing modes, see the Technical Guide (page 41).

*Scanning distances for diffuse scan are obtained with a standard target object (plain white paper).

*Response times for the sensing types: HP 5 ms, nL 1 ms, and FT 250 μs.

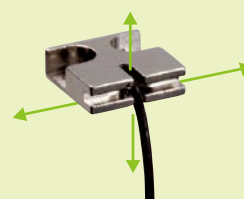
*The values shown in the Minimum detectable size column were obtained with optimal scanning distance and sensitivity settings (HPX-AG).

Outer dimensions



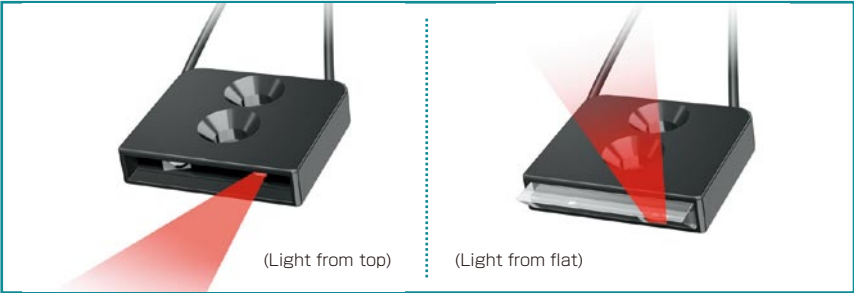
NOTEWORTHY

Cable lead-out is selectable from 4 directions.
HPF-T028



Selective reflection

Resistant to ambient influences.
Use for target object detection in a limited area.

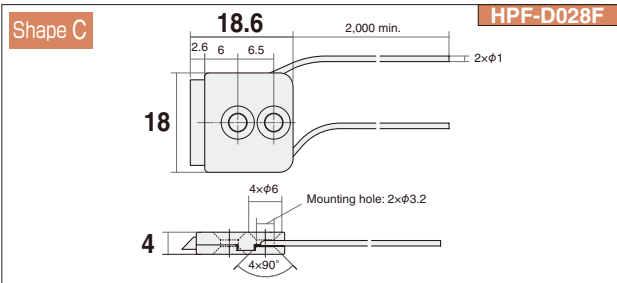
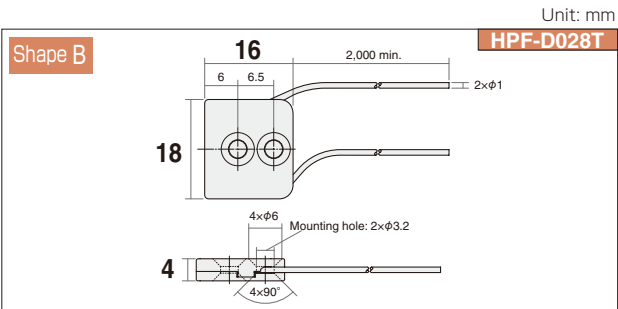
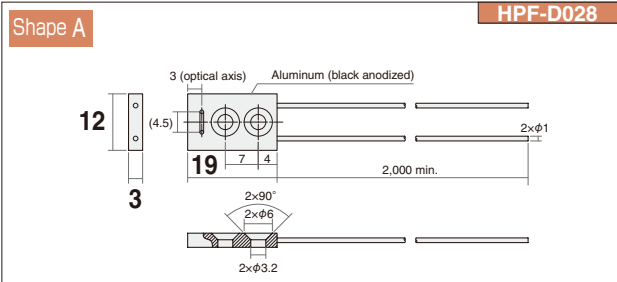


Diffuse scan

Light emitter	Shape	Cable		Scanning distance (mm)		Min. detectable size (mm)	Model No.
		Bend radius	Length	Amp model No.	Mode Distance		
Top	Shape A	R15	2m Free cut	HPX-AG	HP 25±0.5 nL 25±0.5 SF 25±0.5 FT 25±0.5	φ0.005	HPF-D028
	Shape B				HP 74±1.6 nL 74±1.6 SF 74±1.6 FT 74±1.6		
Flat	Shape C	R15	2m Free cut	HPX-AG	HP 52±1.6 nL 52±1.6 SF 52±1.6 FT 52±1.6	φ0.005	HPF-D028F

*For scanning distances of the sensing modes, see the Technical Guide (page 42).
*Scanning distances for diffuse scan are obtained with a standard target object (plain white paper).
*Response times for the sensing types: HP 5 ms, nL 1 ms, and FT 250 μs.
*The values shown in the Minimum detectable size column were obtained with optimal scanning distance and sensitivity settings (HPX-AG).

Outer dimensions



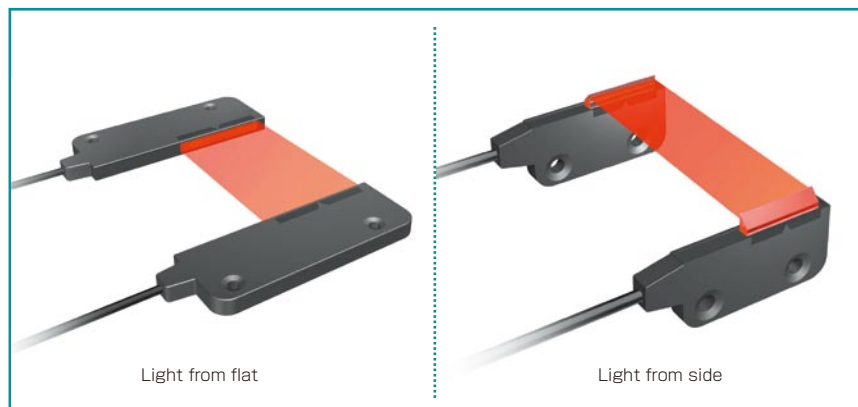
Screw
Cylindrical
Coaxial
Sleeve
Side view
Narrow view
Flat/ Selective reflection
Area
Heatproof
Chemical -proof
Vacuum -proof
Specialized Use
Lens unit
Accessory

Technical
Guide

List of Scanning
Distance by
Amplifier Model

Wide light beam.

Use for target object with varying detection positions, detection of meandering, etc.



[\[Related pages\]](#)

Small part passage sensing

P31



Thru scan

Diffuse scan

Type	Optical configuration	Area width (mm)	Shape	Cable		Scanning distance (mm)			Min. detectable size (mm)	Model No.
				Bend radius	Length	Amp. model No.	Mode	Distance		
Array	Flat	5.25	Shape A  -30~+70°C	R4 Bend tolerant	2m Free cut	HPX-AG	HP	780	φ0.2	HPF-T021
						HPX-EG	nL	225		
						HPX-H	FT	160		
						HPX-A	FT	250		
Screen	Flat	15	Shape B  -30~+70°C	R15	2m Free cut	HPX-AG	HP	3,600	φ0.2	HPF-T021T
						HPX-EG	nL	1,050		
						HPX-H	FT	710		
						HPX-A	FT	550		
	Side	15	Shape C  -30~+70°C	R15	2m Free cut	HPX-AG	HP	3,450	φ0.2	HPF-T021S
						HPX-EG	nL	1,000		
						HPX-H	FT	670		
						HPX-A	FT	600		
Array	Flat	10.85	Shape D  -30~+70°C	R15	2m Free cut	HPX-AG	HP	3,600	φ0.4	HPF-T021WT
						HPX-EG	nL	1,750		
						HPX-H	FT	2,000		
						HPX-A	FT	1,100		
Array	Flat	10.85	Shape E  -30~+70°C	R4 Bend tolerant	2m Free cut	HPX-AG	HP	265	φ0.005	HPF-D026
						HPX-EG	nL	85		
						HPX-H	FT	100		
						HPX-A	FT	60		

*For scanning distances of the sensing modes, see the Technical Guide (page 41).

*Scanning distances for diffuse scan are obtained with a standard target object (plain white paper).

*Response times for the sensing types: HP 5 ms, nL 1 ms, and FT 250 μs.

*The values shown in the Minimum detectable size column were obtained with optimal scanning distance and sensitivity settings (HPX-AG).

NOTEWORTHY

Type

Features

Array type



Small diameter fibers are aligned in a row.
Smaller and slimmer sensor heads are also available.

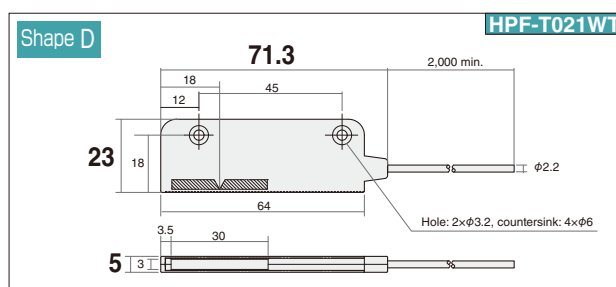
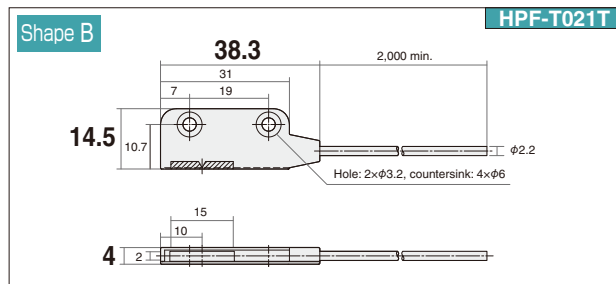
Screen type



Light is collimated using the lens.
This increases the scanning range and makes the light uniform.



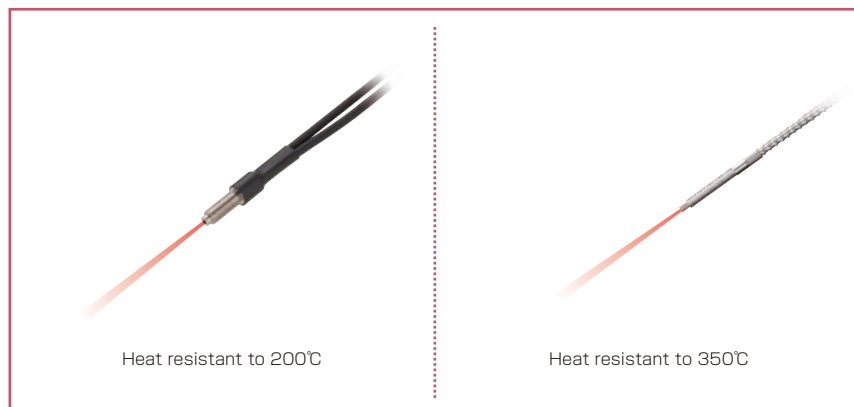
Unit: mm



List of Scanning Distance by Amplifier Model

Heatproof

Resistant to high temperatures.
Use in environments up to 350 °C.



[\[Related pages\]](#)

Compatible lenses

P35

Thru scan

Diffuse scan

Heatproof	Size	Shape	Cable		Scanning distance (mm)			Element	Min. detectable size (mm)	Model No.
			Bend radius	Length	Amp model No.	Mode	Distance			
105°C	Straight	Shape A Lens attachable -30~+105°C	R25	2m Free cut	HPX-AG HPX-EG HPX-H HPX-A	HP	690	φ 1.0	φ 0.005	HPF-T012
						FT	200			
						nL	240			
						FT	140			
150°C	Straight	Shape B Lens attachable -30~+150°C	R35	2m Free cut	HPX-AG HPX-EG HPX-H HPX-A	HP	1,200	φ 1.5	φ 0.01	HPF-T017
						FT	350			
						nL	410			
						FT	240			
200°C	Straight	Shape C Lens attachable -30~+200°C	R15	1m	HPX-AG HPX-EG HPX-H HPX-A	HP	615	φ 1.0	φ 0.005	HPF-T018
						FT	175			
						nL	140			
						FT	80			
350°C	Straight	Shape D Lens attachable -30~+350°C	R15	2m	HPX-AG HPX-EG HPX-H HPX-A	HP	660	φ 1.0	φ 0.005	HPF-T014
						FT	190			
						nL	220			
						FT	130			
105°C	Straight	Shape E -30~+105°C	R25	2m Free cut	HPX-AG HPX-EG HPX-H HPX-A	HP	190	Receiver and emitter φ 1.0	φ 0.005	HPF-D013
						FT	85			
						nL	100			
						FT	55			
150°C	Straight	Shape F -30~+150°C	R35	2m Free cut	HPX-AG HPX-EG HPX-H HPX-A	HP	400	Receiver and emitter φ 1.5	φ 0.005	HPF-D022
						FT	130			
						nL	150			
						FT	90			
200°C	Straight	Shape G -30~+200°C	R15	1m	HPX-AG HPX-EG HPX-H HPX-A	HP	170	φ 1.4	φ 0.005	HPF-D023
						FT	55			
						nL	70			
						FT	42			
200°C	Sleeve	Shape H -30~+200°C	R15	1m	HPX-AG HPX-EG HPX-H HPX-A	HP	170	φ 1.4	φ 0.005	HPF-D024
						FT	55			
						nL	70			
						FT	42			
350°C	Straight	Shape I -30~+350°C	R25	2m	HPX-AG HPX-EG HPX-H HPX-A	HP	160	φ 1.5	φ 0.005	HPF-D015
						FT	75			
						nL	85			
						FT	50			

*For scanning distances of the sensing modes, see the Technical Guide (page 41).

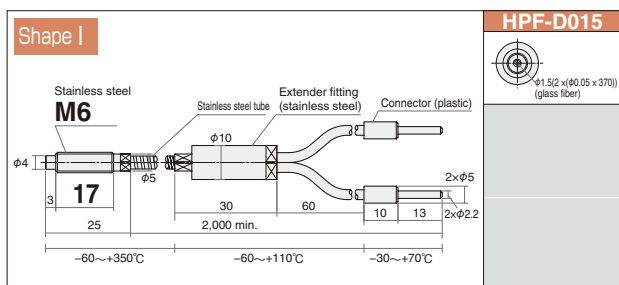
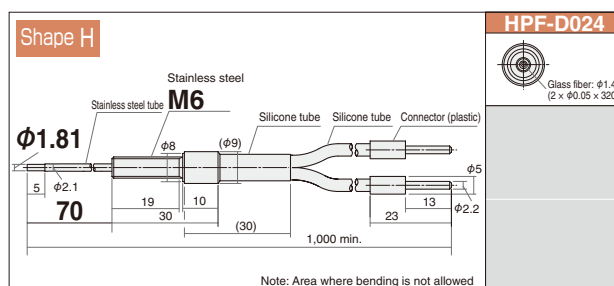
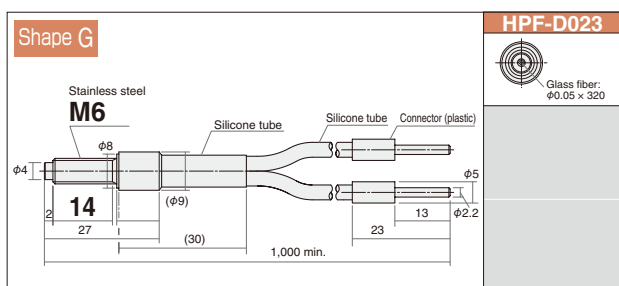
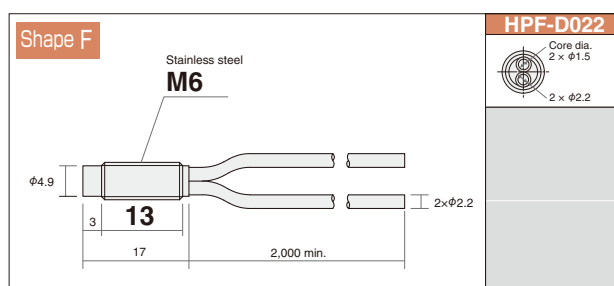
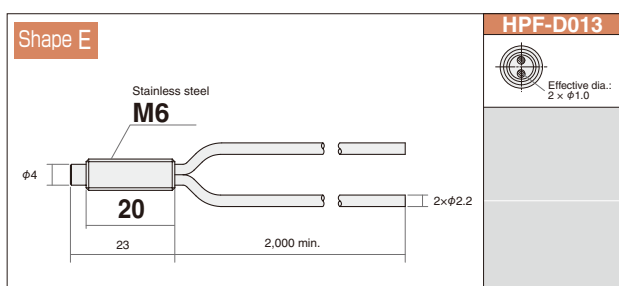
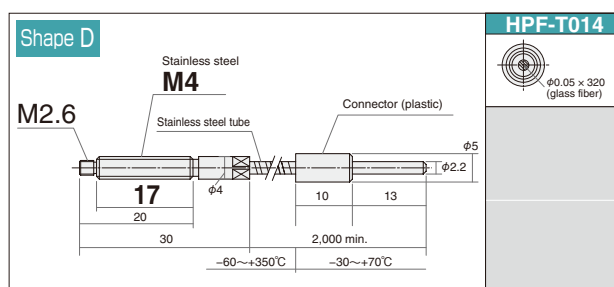
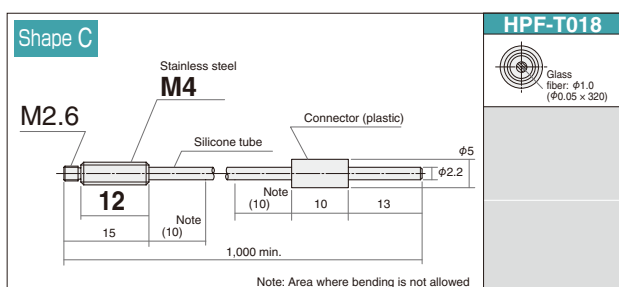
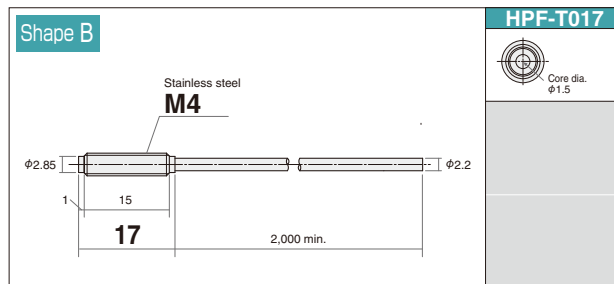
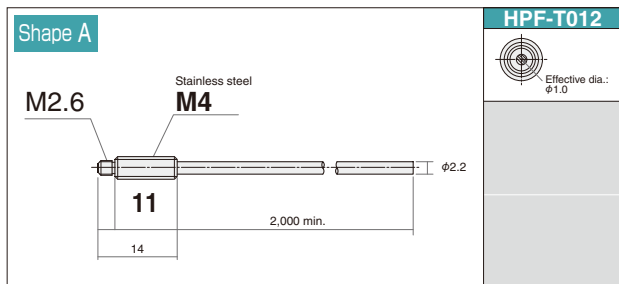
*Scanning distances for diffuse scan are obtained with a standard target object (plain white paper).

*Response times for the sensing types: HP 5 ms, nL 1 ms, and FT 250 μs.

*The values shown in the Minimum detectable size column were obtained with optimal scanning distance and sensitivity settings (HPX-AG).

Outer dimensions

Unit: mm



NOTEWORTHY

Use the lens unit appropriate for your application.
*Select a lens with the desired heat resistance.

Heatproof temp.	Lens	Type	Sensitivity
200°C	FE-PA-L1	Long distance	Approx. x6
200°C	FE-PA-S1	Side	—
350°C	HPF-VL06	Long distance	Approx. x10
350°C	HPF-VL05	Side	—

*Compatible lens units P. 35

Protected with PFA tubing for excellent chemical resistance.



【Related pages】

Wet process sensors
for level & leak
detection

P31

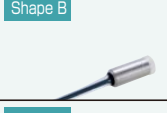
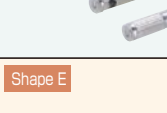
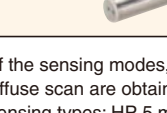


Usage notes

P38

Thru scan

Diffuse scan

Light emitter	Size	Shape	Cable		Scanning distance (mm)			Min. detectable size (mm)	Model No.
			Bend radius	Length	App. model No.	Mode	Distance		
Top	φ4.7	Shape A 	R20	2m Free cut	HPX-AG	HP	1,310	φ0.1	HPF-T029
						FT	4,500		
						nL	1,500		
						FT	880		
Top	φ4.7	Shape B 	R20	2m Free cut	HPX-AG	HP	240	φ0.1	NEW HPF-T029E
						FT	825		
						nL	280		
						FT	160		
Top	φ6.3	Shape C 	R35	5m Free cut	HPX-AG	HP	410	—	NEW HPF-T029H-L05
						FT	1,400		
						nL	410		
						FT	180		
Side	φ4.7	Shape D 	R20	2m Free cut	HPX-AG	HP	300	φ0.1	HPF-T035
						FT	1,030		
						nL	350		
						FT	210		
Top	φ6	Shape E 	PFA area: R80 Cable area: R20	2m Free cut	HPX-AG	HP	170	—	HPF-D014
						FT	55		
						nL	70		
						FT	42		
						HPX-H	50		
						HPX-A	50		

*For scanning distances of the sensing modes, see the Technical Guide (page 41).

*Scanning distances for diffuse scan are obtained with a standard target object (plain white paper).

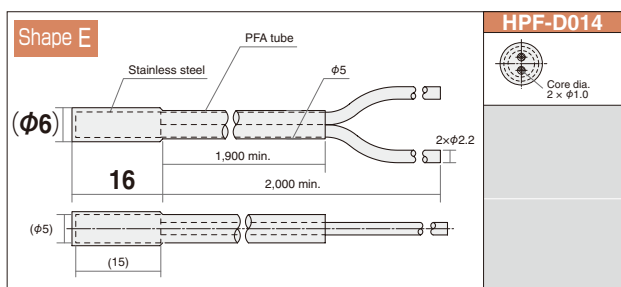
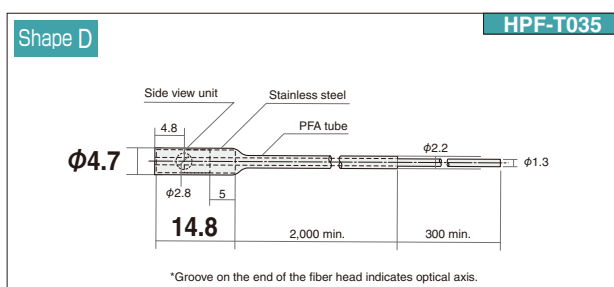
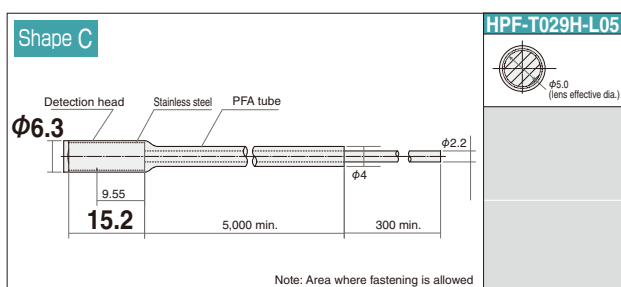
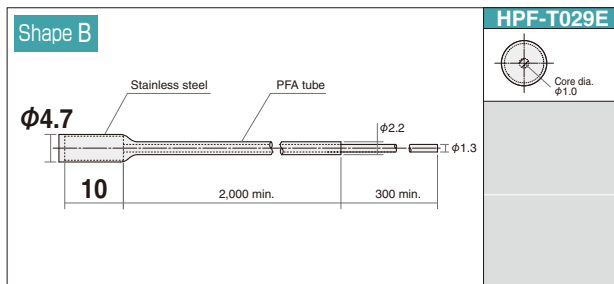
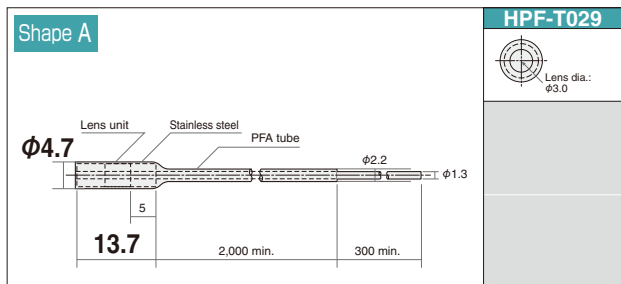
*Response times for the sensing types: HP 5 ms, nL 1 ms, and FT 250 μs.

*For chemical resistance of fluorine-resin, see the Technical Guide (page 51).

*The values shown in the Minimum detectable size column were obtained with optimal scanning distance and sensitivity settings (HPX-AG).

Outer dimensions

Unit: mm



NOTEWORTHY

Installation man-hours greatly reduced

Simply cut the PFA-jacketed cable to length and insert as is into the amplifier.

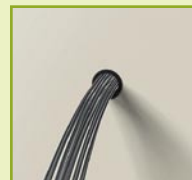
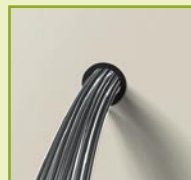


Simply cut the PFA-jacketed cable.



Insert as is into the amplifier. The insertion area requires no PFA working.

Saves space



Tube has small outside diameter of 2.2 mm, which can save considerable space compared with previous models. Bend radius is also greatly improved.

Screw

Cylindrical

Coaxial

Sleeve

Side view

Narrow view

Flat/
Selective
reflection

Area

Heatproof

Chemical
-proof

Vacuum
-proof

Specialized
Use

Lens unit

Accessory

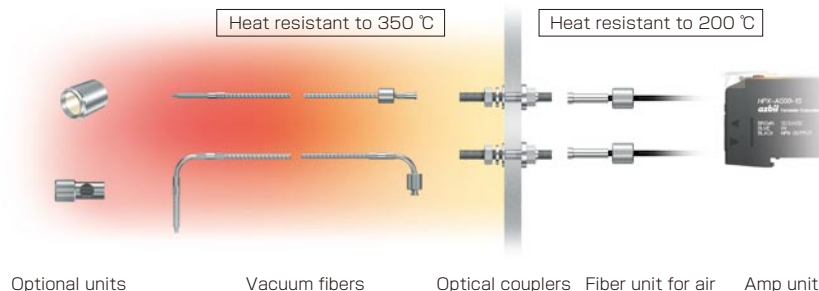
Technical
Guide

List of Scanning
Distance by
Amplifier Model

Vacuum-proof

Usable in a vacuum.
Cable length can be specified.

Product configuration



[\[Related pages\]](#)

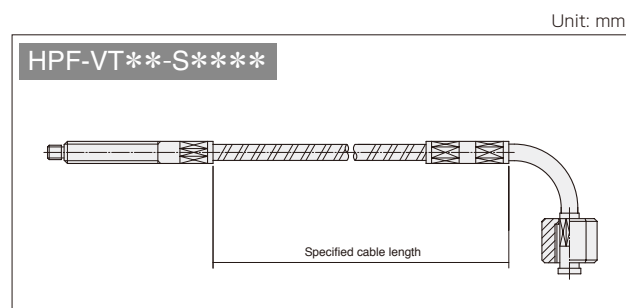
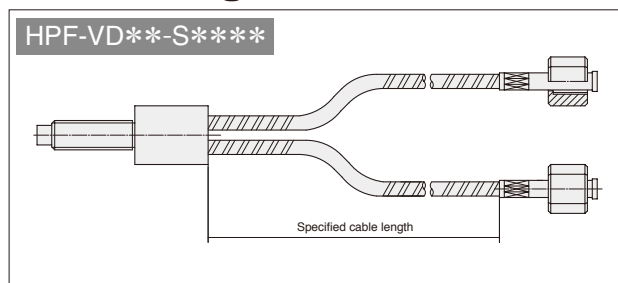
Usage notes

P38

Configuration of vacuum fiber model numbers

HPF	-VT	0	S	-S1000	(Typical examples)	
Base model No.	Model	Head shape	Coupler side shape	Cable length	Description	
HPF	-VT				Thru scan	
	-VD				Diffuse scan	
		0			Straight	
		1			Elbow (VT type only)	
			S		Straight	
			E		Elbow	
					Cable length	Ordering increment
				-S****	25mm~500mm	25mm
				-S****	550mm~1500mm	50mm
				-S****	1600mm~5000mm	100mm

Cable drawing

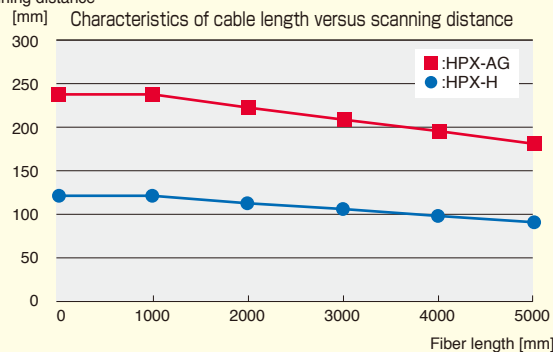


CHART

◇Scanning distance characteristics

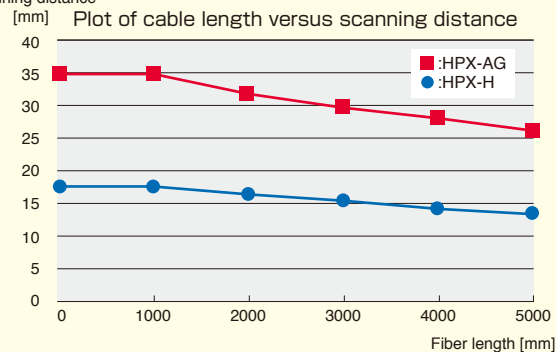
Thru scan

Scanning distance



Diffuse scan

Scanning distance



*For fiber units for air, HPF-VA01 is used for calculation.

*Scanning distances for diffuse-scan were obtained using a standard target object (plain white paper).

*For calculations, nL was used as the sensing type for HPX-AG.

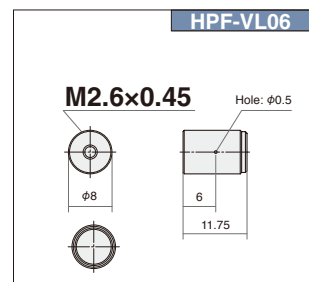
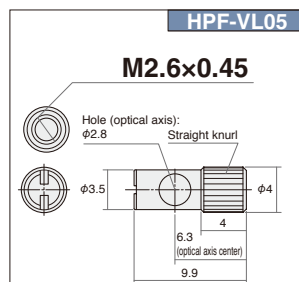
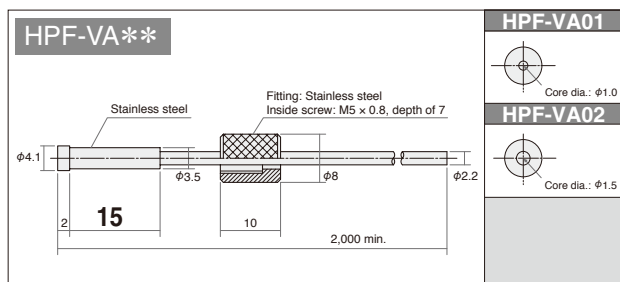
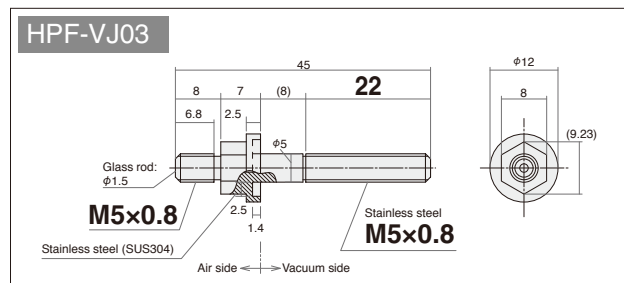
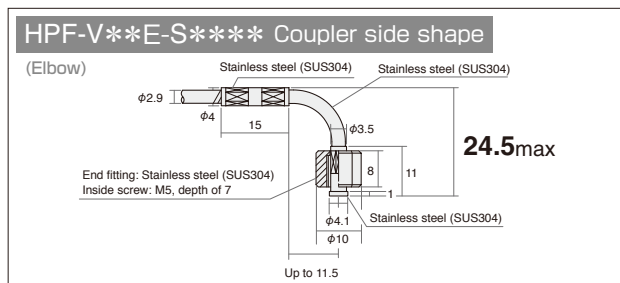
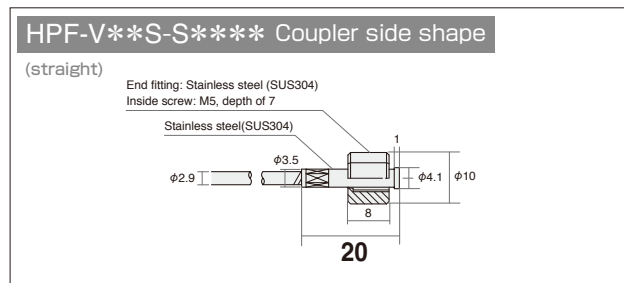
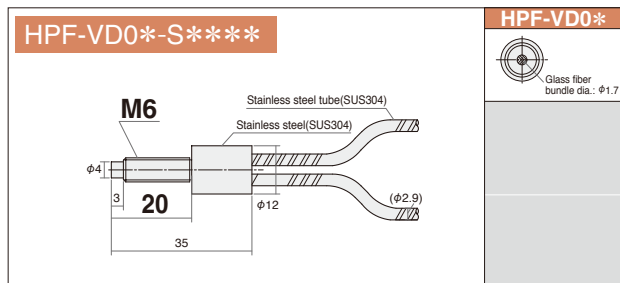
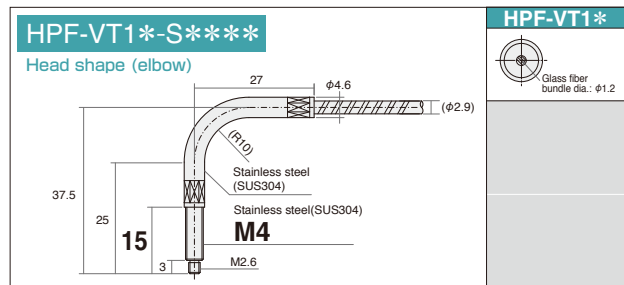
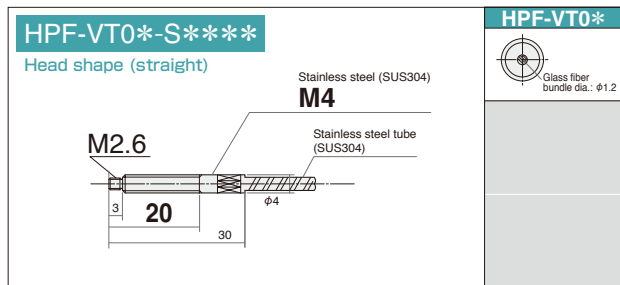


Options for vacuum fiber unit

Product name	Shape	Heatproof	Other specifications	Model Number
Optical coupler (two units)		200°C	—	HPF-VJ03
Fiber unit for air (two units in a pair)		70°C	Cable length: 2 m Bend radius: R20 Free cut	HPF-VA01
		150°C	Cable length: 2 m Bend radius: R35 Free cut	HPF-VA02-B
Long-distance lens unit (two units)		350°C	Scanning distance: × 10	HPF-VL06
Side-view unit (two units)		350°C	—	HPF-VL05

Outer dimensions

Unit: mm



Screw

Cylindrical

Coaxial

Sleeve

Side view

Narrow view

Flat/
Selective
reflection

Area

Heatproof

Chemical
-proof

Vacuum

Use

Specialized

Lens unit

Accessory

Technical
Guide

List of Scanning
Distance by
Amplifier Model

Small Parts Passage Detection Fiber



Reliably detects small parts in the pipe.

- Small parts can be reliably detected by light penetrating the pipe.
- Fiber elements have high bend tolerance for use in areas with moving equipment.

Thru scan

Area width	Shape	Cable		Model No.
		Bend radius	Length	
12mm (6mm)	Shape A  -30~+70°C	R4	0.5m	NEW HPF-T047

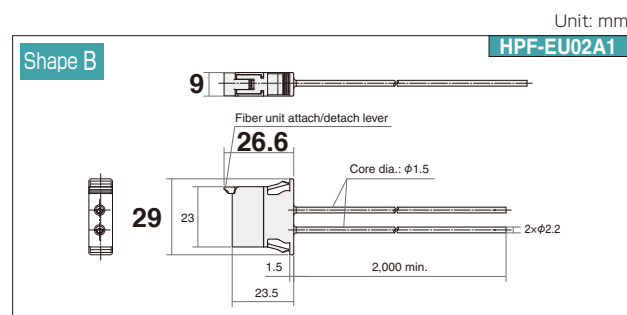
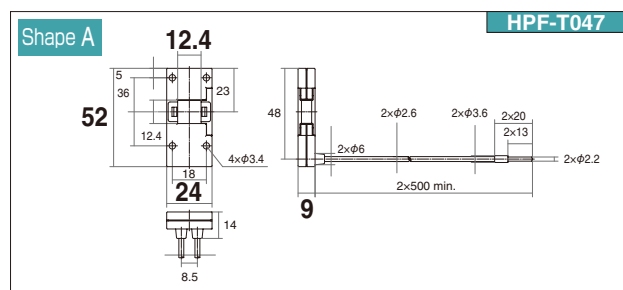
Product name	Shape	Cable		Model No.
		Bend radius	Length	
Mixed fiber unit	Shape B  -30~+70°C	R25	2m Free cut	HPF-EU02A1

*Area width can be changed with attachments (sold separately).

*Use HPF-T047 in combination with HPF-EU02A1.

*Use HPF-EU02A1 for scanning distances of 50 cm or more.

Outer dimensions



Contact Liquid Level Fiber



All-resin structure ensures no metal contamination.

- Problems due to liquid accumulation are reduced by Yamatake's innovative front end structure.
- Product lineup includes small-diameter type ($\phi 4$) for easier cable routing.

[Related pages]

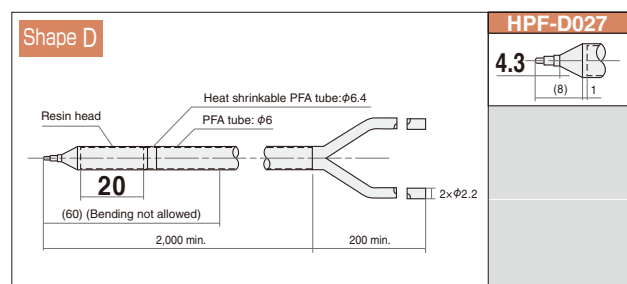
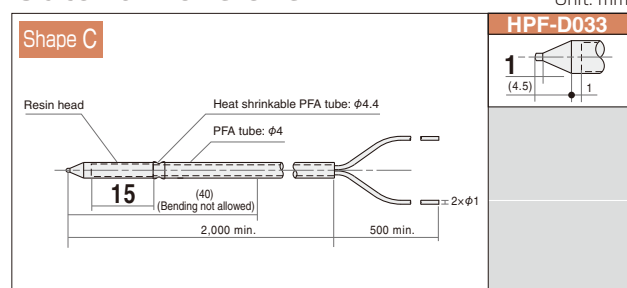
Usage notes

P38

Diffuse scan

Type	Shape	Cable		Model No.
		Bend radius	Length	
$\phi 4$	Shape C  -30~+105°C	PFA area: R30 Cable area: R15	2m Free cut	HPF-D033
$\phi 6$	Shape D  -30~+105°C	PFA area: R40 Cable area: R25	2m Free cut	HPF-D027

Outer dimensions



Pipe-Mounted Liquid Level Fiber



A 16-axis array of light beams greatly eliminates interference from water droplets and air bubbles.

- Product lineup includes differing detection methods for fail-safe detection.
- Can be used for pipe diameters of 3~19 mm.

[\[Related pages\]](#)

Usage notes

[P38](#)

Thru scan

(Attaching to pipe)

Type	Compatible pipe dia.	Shape	Cable			Model No.
			Bend radius	Length	Coating material	
Liquid-present Received light	$\phi 3 \sim \phi 13 \text{ mm}$	 -30~+70°C	R4	5m Free cut	PFA	HPF-T032
				2m Free cut	Polyethylene	NEW HPF-T032E
				2m Free cut	Polyethylene	NEW HPF-T032E-L02
Liquid-absent Received light	$\phi 8 \sim \phi 19 \text{ mm}$ (3/4B)	 -30~+70°C	R4	5m Free cut	PFA	HPF-T034
				2m Free cut	Polyethylene	NEW HPF-T034E
				2m Free cut	Polyethylene	NEW HPF-T034E-L02

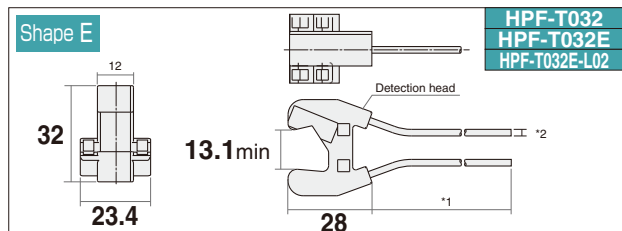
*Use with PFA transparent pipe with wall thickness of 1 mm.

*Depending on the pipe actually used, as well as the liquid thru scan and refractive ratios, fiber unit detection may not be reliable, so be sure to test the operation before use.

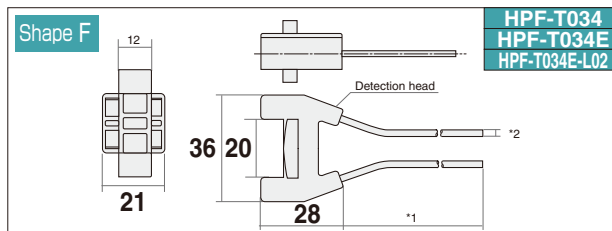
*If the fiber unit is used with other than the recommended pipe, material, or wall thickness, please test before use or consult our sales staff.

Outer dimensions

Unit: mm



Model No.	Cable length*1	Cable dia.*2
HPF-T032	5000mm min.	2× $\phi 2.3$
HPF-T032E	5000mm min.	2× $\phi 2.2$
HPF-T032E-L02	2000mm min.	2× $\phi 2.2$



Model No.	Cable length*1	Cable dia.*2
HPF-T034	5000mm min.	2× $\phi 2.3$
HPF-T034E	5000mm min.	2× $\phi 2.2$
HPF-T034E-L02	2000mm min.	2× $\phi 2.2$

Liquid Leakage Fiber



Outstanding ease of routing with the PFA jacket employed

- Space-saving sensor head height of only 9.9 mm
- Can be used in explosion-proof atmospheres due to the fiber type

[\[Related pages\]](#)

Usage notes

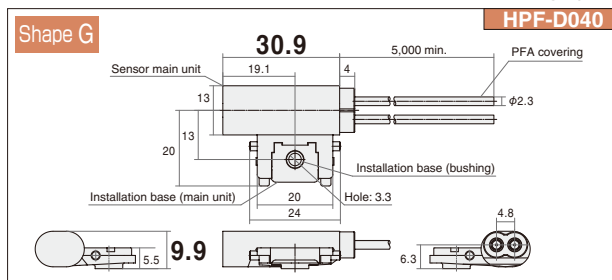
[P38](#)

Diffuse scan

Shape (mm)	Cable		Model No.
	Bend radius	Length	
 -30~+70°C	R20	5m Free cut	HPF-D040

Outer dimensions

Unit: mm



Lens unit achieving a micro-spot by combination with the coaxial type.
Lenses can be selected according to the target object size.



[Related pages]

Compatible fiber units

P13 (Coaxial)

For diffuse scan type

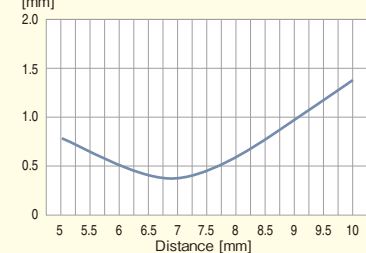
Type	Shape	Minimum spot dia.	Focus distance	Combined fiber		Model No.
				Model Number	Spot dia.	
Micro-spot	Shape A 	Approx. 0.1 mm 	4.6 mm $\pm$ 0.2 mm	HPF-D034 HPF-D010 HPF-D032 HPF-D035	Approx. 0.1 mm Approx. 0.2 mm Approx. 0.2 mm Approx. 0.2 mm	HPF-LU07
	Shape A 	Approx. 0.2 mm 	7.0 mm $\pm$ 0.5 mm	HPF-D034 HPF-D010 HPF-D032 HPF-D035	Approx. 0.2 mm Approx. 0.4 mm Approx. 0.4 mm Approx. 0.4 mm	
	Shape B 	Approx. 1.0 mm 	19 mm $\pm$ 1.0 mm	HPF-D034 HPF-D010 HPF-D032 HPF-D035	Approx. 1.0 mm Approx. 2.0 mm Approx. 2.0 mm Approx. 2.0 mm	HPF-LU02
	Shape C 	Approx. 1.0 mm 	33 mm $\pm$ 2.0 mm	HPF-D038	Approx. 1.0 mm	
Variable spot	Shape D 	Approx. 0.4 mm 	Fiber insertion depth: 6 mm 7.0 $\pm$ 1.0 mm Fiber insertion depth: 9.5 mm 10 $\pm$ 1.0 mm	HPF-D035C	ϕ 0.4~3.5mm	HPF-LU09

CHART

◇ Characteristics of distance versus spot dia. (typical example)

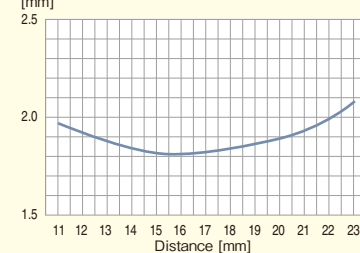
HPF-LU01

Spot dia. Characteristics of distance versus spot dia.



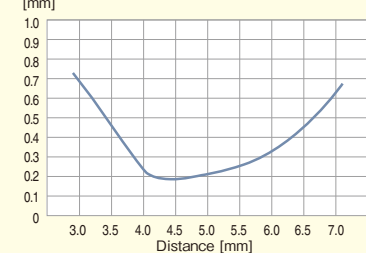
HPF-LU02

Spot dia. Characteristics of distance versus spot dia.



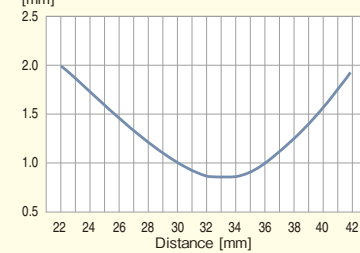
HPF-LU07

Spot dia. Characteristics of distance versus spot dia.

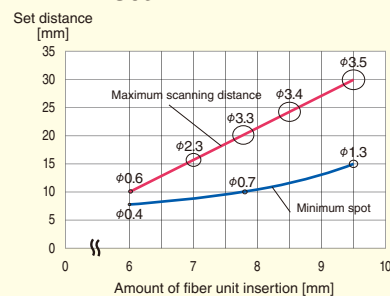


HPF-LU08

Spot dia. Characteristics of distance versus spot dia.



HPF-LU09



The chart shows the following characteristics in relation to the amount of fiber unit insertion:

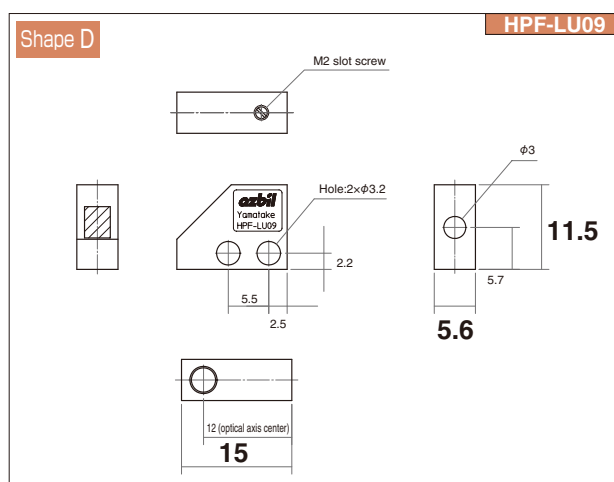
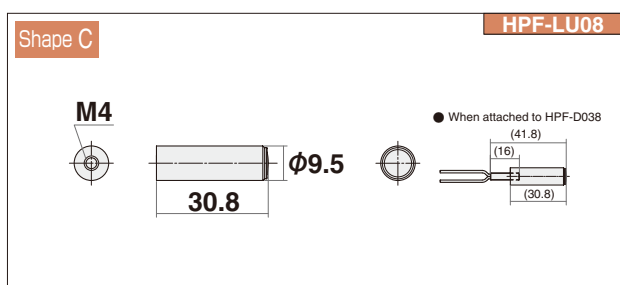
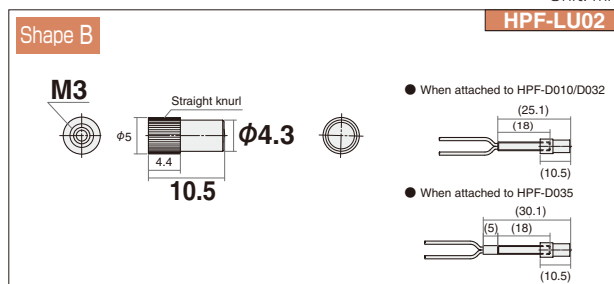
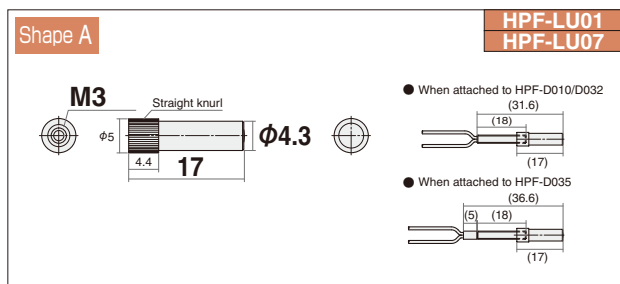
- The set distance and spot dia. achieving the minimum spot
- The spot dia. at the maximum scanning distance

*Values are for the lens combined with an HPF-D035 fiber unit.
*Measured values are calculated at 13.5 % of the peak light level.
(Only HPF-LU07 is calculated at 50 %.)



Outer dimensions

Unit: mm

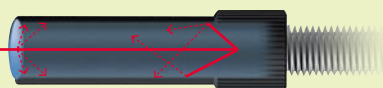


NOTEWORTHY

- Improving detection performance yields many positive results

Because of irregular reflection inside a lens, some light is returned even when no workpiece is present, but it is a small amount compared with the light reflected when there is a workpiece. In HPF-LU sensors, the internal wall of the lens has a special feature that keeps this internal reflection to a minimum, so there is an increased amount of difference in light level when a workpiece is actually present.

Light actually used for detection



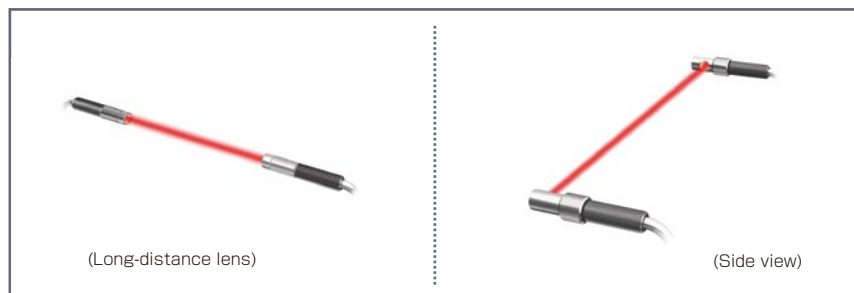
- Problems due to scratches on the lens are greatly reduced.

The micro-spot lens is made of hard glass, so problems caused by a drop in light level due to lens scratches made by collisions with workpieces can be greatly reduced.



Screw
Cylindrical
Coaxial
Sleeve
Side view
Narrow view
Flat/Selective reflection
Area
Heatproof
Chemical-proof
Vacuum-proof
Specialized Use
Lens unit
Accessory
Technical Guide
List of Scanning Distance by Amplifier Model

Longer distances and alternate optical configurations are available by combination with thru-scan sensors



[Related pages]

For combined fibers:

P7 (screw)

P11 (cylindrical)

P25 (heatproof)

P29 (vacuum proof)

For use with thru scan

Type	Shape	Scaling	Directional angle (half angle)	Fiber unit		Scanning distance (mm)				Model No.
				Model Number	Element type	HPX-AG	HPX-EG	HPX-H	HPX-A	
Long-distance lens	Shape A	×6	3°	HPF-T003	Standard	7,200	2,040	2,400	1,200	FE-PA-L1
				HPF-T018	Heatproof	3,690	690	900	600	
				HPF-T024	Unbreakable	840	240	300	150	
	Shape B	×10	3°	HPF-T003	Standard	12,000	3,400	4,000	2,000	HPF-VL06
				HPF-T018	Heatproof	6150	1,150	1,500	1,000	
				HPF-T024	Unbreakable	1,400	410	500	250	
Side view	Shape C	—	10°	HPF-T003	Standard	1,200	340	400	200	FE-PA-S1
				HPF-T018	Heatproof	615	115	150	100	
				HPF-T024	Unbreakable	140	41	50	25	
	Shape D	—	8°	HPF-T003	Standard	1,200	340	400	200	HPF-VL05
				HPF-T018	Heatproof	615	115	150	100	
				HPF-T024	Unbreakable	140	41	50	25	

*The scanning distances shown are nominal values. The actual scanning distances are limited by the fiber length (approx. 2 m × 2 ÷ 4 m in the case of standard type).

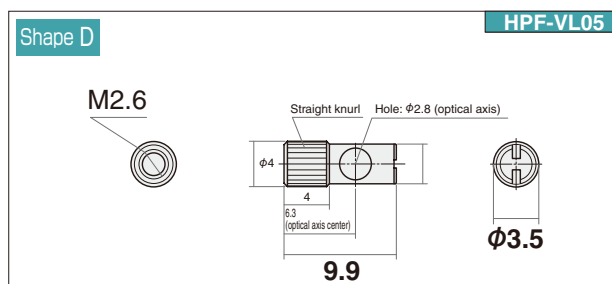
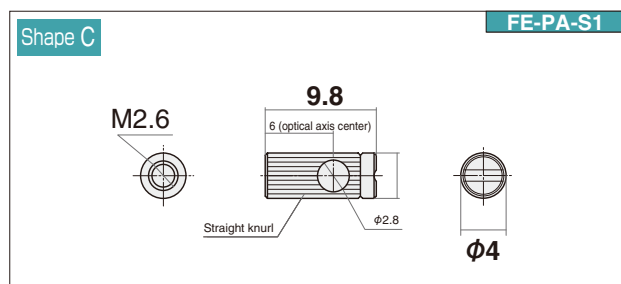
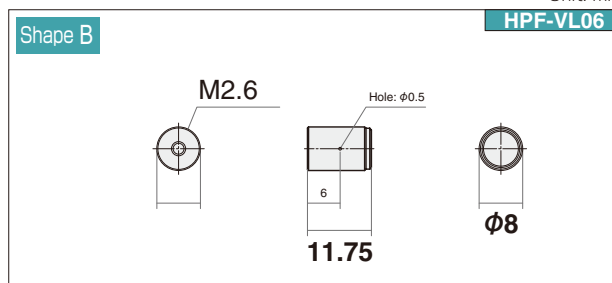
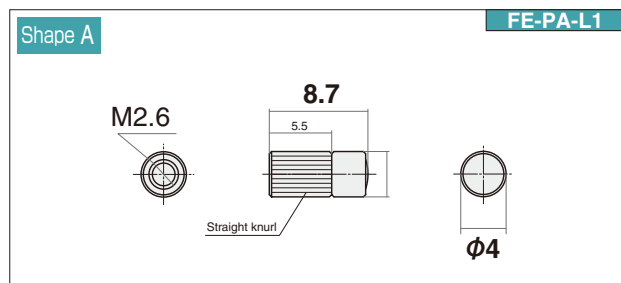
*For HPX-AG, the scanning distance shown is for HS mode (response time: 5 ms).

*For HPX-EG, the scanning distance shown is for nL mode (response time: 1 ms).

*The directional angles shown are typical examples obtained when the lens is combined with an HPF-T003.

Outer dimensions

Unit: mm

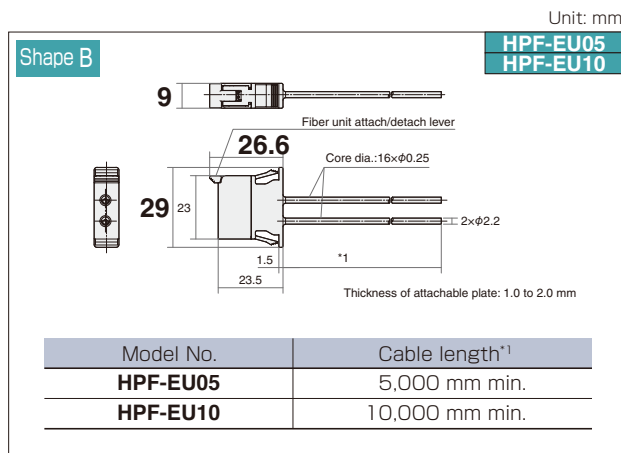
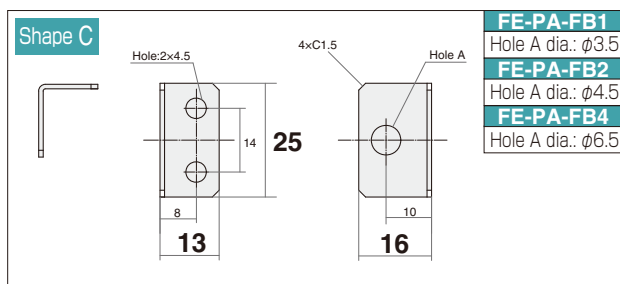
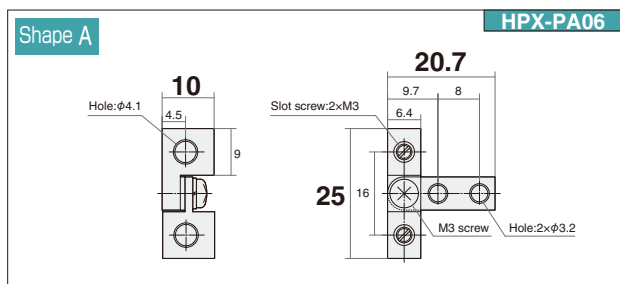




Use in combination with various fiber units

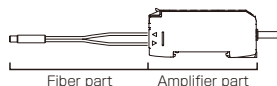
Product name	Shape	Description	Other specifications	Model No.
Angle adjustment bracket	Shape A 	Use with a thru-scan fiber unit to limit reflection, or use as side view type brackets.	Used for M4 and M3 heads, $\phi 4$ and $\phi 3$	HPX-PA06
Fiber-optic extender	Shape B 	Use to extend fibers by linking them. For scanning range see p. 40.	Cable length: 5 m. Bend: 4 mm in radius Free cut Cable length: 10 m. Bend: 4 mm in radius Free cut	HPF-EU05 HPF-EU10
Fiber head bracket	Shape C 	Suitable for attaching a fiber head.	For M3 head For M4 head For M6 head	FE-PA-FB1 FE-PA-FB2 FE-PA-FB4
Small-diameter attachment		Use in combination with small-dia. fiber units. *Supplied with applicable fibers.	For fibers with dia. of $\phi 1.0$ For fibers with dia. of $\phi 1.3$	HPF-AT10 HPF-AT13
Fiber cutter		Use to cut fibers. *Supplied with applicable fibers.	Used for freehand cuttable fibers	FE-PA-F1

Outer dimensions

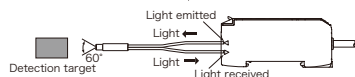
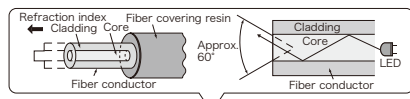


Detection Method

Optical fiber sensor



A fiber is composed of a central core and circumferential cladding where the refractive index is low. Light travels inside the core, with repeated total reflection along the boundaries between the core and the cladding. Light emerging from the fiber is emitted and spreads out at an angle of approximately 60°.



- The optical fiber does not have any electrical properties and so is excellent in an environment where reduced electrical noise is required.
- Different fiber variations allow for various applications.

Optical Fiber Types and Characteristics

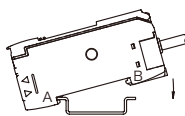
	Stationary bend type (multi-core)	Standard type (single core)	Bend-tolerant type (bundle)
Cross-section			
Structure	 (The inner elements are grouped into one.)		 (The internal elements are not attached to each other.)
Features	· Bending causes a small variation in the light level. · Allowable bend radius: 1 or 2 mm	· Good light transmission efficiency (relatively long scanning distance) · Allowable bend radius: 10 or 20 mm	· Good bend tolerance · Bend repetition of one million times or more (typical) · Allowable bend radius: 4 mm
Useful applications	Comparison with the previous standard type: · Soft and capable of cabling like electric wires · No worries about bend radius · Touching the fiber does not affect the light level.	Used frequently for general purposes. Low price.	Resistant to break even when used in a moving environment
Typical model number	Thru scan: HPF-T025 Diffuse scan: HPF-D030	Thru scan: HPF-T003 Diffuse scan: HPF-D002	Thru scan: HPF-T008 Diffuse scan: HPF-D037

Usage Notes (general)

How to attach the amplifier unit

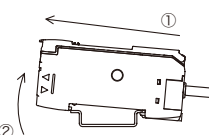
Attach the amplifier unit to the dedicated bracket (HPX-PA04, supplied or sold separately) or to the DIN rail.

- 1 Insert one rail of the bracket or DIN rail into the slot at point A.
- 2 Push the unit downwards until the second rail clicks into place at point B. When attaching the amplifier to a DIN rail, be sure to secure both ends with the end plate (HPX-PA03, sold separately).



How to remove the amplifier unit

Push the amplifier forward firmly (①) so that the front lock releases. Lift the unit as shown in the figure (②) to remove the unit.

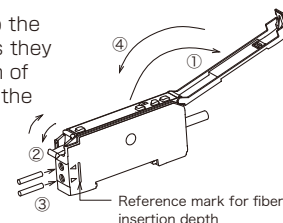


Expansion unit attachment to the main unit for reduced-wiring models (HPX-AG/EG series)

- 1 Remove the stickers affixed to the connectors of the units to be attached.
- 2 Mount the expansion units side by side on the DIN rail.
- 3 Slide the expansion units together so that the connectors connect.
- 4 Use end plates (HPX-PA03, sold separately) to hold the expansion units in place. To remove expansion units, slide off one by one.

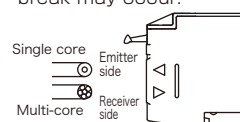
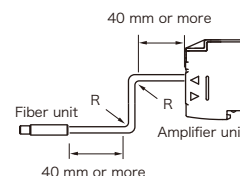
Attaching the fiber unit to an amplifier

- 1 Open the cover.
- 2 Tilt the fiber clamp lever forwards to the release position.
- 3 Firmly insert the fiber tips into the holes in the amplifier as far as they will go. For the insertion depth of the fiber, refer to the mark on the side of the unit.
- 4 Close the cover.



Caution

- If the fiber is thin, first insert it into the thin fiber adapter so that the fiber projects approximately 0.5 to 1 mm from the top of the adapter. Then insert the adapter into the hole in the amplifier as far as it will go, and then fix it firmly.
- Because a cable break tends to easily occur around the fiber unit's sensing head and junction with the amplifier unit, do not bend the cable within 40 mm (10 mm for a thin fiber unit). In other cabling areas, use the fiber cable at the allowed bending radius or more specified for each product. If the cable is bent beyond the allowed bend radius, the rated scanning distance may be unavailable or a cable break may occur.



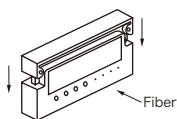
When attaching a coaxial diffuse scan fiber unit to a main unit, attach the single-core fiber cable to the insertion hole's emitter side, and attach the multi-core fiber cable to the receiver side.

Scanning distances and display readouts may differ depending on variations in individual unit characteristics, installation states and fiber unit types.

Cutting of fibers

To cut a fiber, use the dedicated cutter (supplied with the fiber unit). Note that cold-proof and heatproof fibers cannot be cut.

- 1 Insert the fiber into the cutter hole and set the fiber to the specified length.
 - 2 Press the blade straight down in a strong smooth motion.
 - 3 Cut one fiber cable at a time and do not reuse the blade on another optical fiber.
- When the detecting surface of the fiber unit gets dirty, gently wipe it with a soft clean cloth. Do not use organic solvents such as benzene or thinner.
 - The scanning distance may be reduced approximately 20% depending on how the fiber is inserted into the amplifier unit and how the fiber is cut.
 - For specifications, usage notes and other information for the fiber unit, see the product specifications.



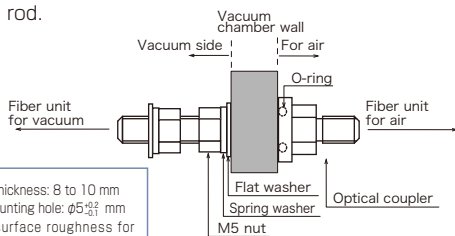
Caution

Never disassemble the cutter. The blade may cause injury.

Use Cautions (type specific)

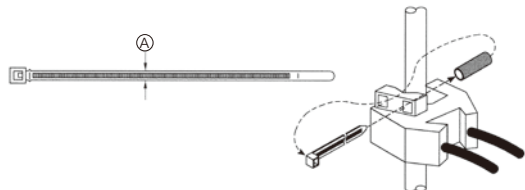
Vacuum fiber

- Vacuum fiber HPF-V series
The flange, fibers for vacuum and the lens unit are cleaned with IPA, but baking treatment etc. should be carried out before use.
- Cautions for attaching the optical coupler
The optical coupler uses an O-ring as shown below. Do not weld it to the vacuum chamber wall, as this may cloud the inside glass rod.



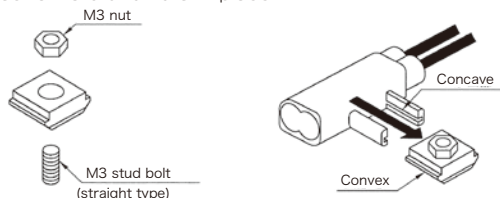
Specialized use: Pipe-mounted liquid level detection

Attach the unit using the supplied cable ties and non-slip tubes as shown below. Securely fasten both the upper and lower cable ties and cut off any excess. Where additional cable ties are required, use ones which are no more than 2.5 mm wide (dimension A in the figure).



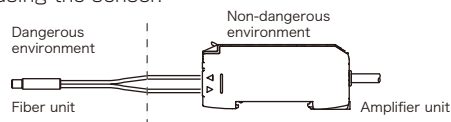
Specialized use: Liquid leakage detection

When using an SUS mounting base, insert the welded M3 stud bolt into the base's mounting hole and fasten it with an M3 nut (not supplied). Then put the ridges of the mounting base into the grooves of the fiber unit, and slide the base forward until it is in place.



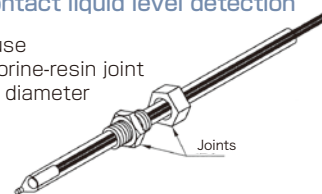
Use under explosion-proof atmospheres

Generally, the fiber unit is structured only to transmit light and so cannot cause electrical explosions or ignite fires. Therefore, the fiber and amplifier units can be used with the fiber unit placed in a dangerous place, and the amplifier unit in a non-dangerous place. Nevertheless, check the explosion-proof regulations required for the equipment used before using the sensor.

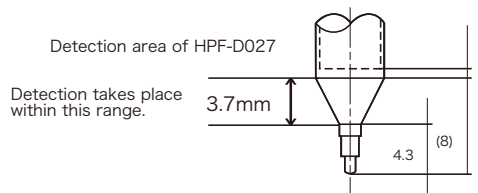


Specialized use: Contact liquid level detection

When installing the unit, use commercially-available fluorine-resin joint that matches the outside diameter of the PFA tube.



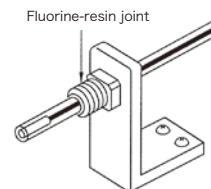
- Operation may be unstable with the following conditions:
 - ① Air bubbles adhering to the conical part of the sensing head
 - ② Chemical precipitate on the conical part of the sensing head
 - ③ Liquids of high viscosity
- Some liquid properties, such as milky white color, may make the liquid undetectable.
- Be careful not to bump the fiber unit tip (especially the conical part). Operation may be unstable due to scratches on or deformation of the sensing head.
- If chattering occurs due to liquid dripping or bubbles, use a timer.



Liquid level detection positions vary depending on the surface tension of the liquid, and the wet condition of the fiber unit's detection area.

Chemical proof

- When installing the unit, use commercially-available fluorine-resin joint that matches the outside diameter of the PFA tube.
- The bend radius of the protective tube must be greater than the bend radius specified for each fiber unit. If the bend radius is below the specified value, the fiber unit may break.
- Do not apply excessive tension to the fiber-optic cable.



Screw

Cylindrical

Coaxial

Sleeve

Side view

Narrow view

Flat/Selective reflection

Area

Heatproof

Chemical-proof

Vacuum-proof

Specialized Use

Lens unit

Accessory

Technical Guide

List of Scanning Distance by Amplifier Model

PFA Chemical Proof

Substance	PFA chemical proof
Heavy oils A/B/C	○
Aniline	○
Acrylonitrile	○
Asphalt	○
Acetone	○
Methanol	○
Ammonia	○
Isooctane	○
Isobutyl alcohol	○
Isobutyl methyl ketone	○
Ethanol	○
Ether	○
Ethylene glycol	○
Enamel paint	○
Ammonium chloride	○
Calcium chloride	○
Sodium chloride	○
Barium chloride	○
Chlorine	○
Gasoline	○
Glass ingredients	○
Dilute hydrochloric acid	○
Dilute sodium hydroxide	○
Dilute acetic acid	○
Dilute nitric acid	○
Dilute sulfuric acid	○
Citric acid	○
Glycerin	○
Cresol	○
Chloroform	○

Substance	PFA chemical proof
Light oil	○
Paraffinum liquidum	○
Sodium dichromate	○
Barium nitrate	○
Silicone oil	○
Plant oil	○
Thinner	○
Barium hydroxide	○
Phenol	○
Turbine oil	○
Sodium carbonate	○
Turpentine	○
Natural volatile oil	○
Kerosine petroleum	○
Trichloroethane	○
Trichlorethylene	○
Toluene	○
Naphtha	○
Acidum lacticum	○
Nitrobenzene	○
Hydrofluoric acid** (hydrogen fluoride)	△
Ferrosilicon	○
Freon 11	○
Propyl alcohol	○
Propylene glycol	○
Benzene	○
Methyl violet	○
Water	○
Carbon tetrachloride	○
Ammonium sulfate	○

*Please be aware that the above table does not guarantee usability.

**For more information on hydrofluoric acid, please contact our sales staff.

Characteristics Fiber Length versus Scanning Distance

Note that extending fiber length reduces scanning distance.

◇ Standard fiber element

Element type		Distance change ratio for each element length						
Core dia.	Bend radius	2m	5m	10m	15m	20m	25m	30m
φ0.25	R4	100%	62%	28%	12%	Unavailable	Unavailable	Unavailable
φ0.5	R1	100%	66%	33%	17%	Unavailable	Unavailable	Unavailable
	R15	100%	85%	64%	49%	37%	28%	21%
φ0.75	R15	100%	85%	64%	49%	37%	28%	21%
φ1	R2	100%	76%	48%	30%	19%	12%	Unavailable
	R5	100%	50%	16%	Unavailable	Unavailable	Unavailable	Unavailable
	R20	100%	85%	64%	49%	37%	28%	21%

◇ Heatproof fiber element

Element type	Distance change ratio for each element length							
Heatproof	1m	2m	5m	10m	15m	20m	25m	30m
105℃	—	100%	57%	22%	Unavailable	Unavailable	Unavailable	Unavailable
150℃	—	100%	50%	16%	Unavailable	Unavailable	Unavailable	Unavailable
200℃	100%	93%	76%	54%	38%	27%	19%	13%
350℃	—	100%	81%	58%	41%	29%	20%	14%

Characteristics of Scanning Distance by Combination with Fiber Extender (typical values)



Thru scan

Type	Model Number	Scanning distance and cable length when combined with fiber extender: HPX-AG (HP mode: 5 ms in response time)*1		
		No extender	HPF-EU05(5m)	HPF-EU10(10m)
 Standard fiber	HPF-T003 Related pages P7	1200mm	580mm	440mm
		Cable length: 2m	Cable length: 7m	Cable length: 12m
		100%	49%	37%
 Heatproof	HPF-T018 Related pages P25	615mm	250mm	195mm
		Cable length: 1m	Cable length: 6m	Cable length: 11m
		100%	42%	32%
 Area	HPF-T021T Related pages P23	3600mm	1510mm	1150mm
		Cable length: 2m	Cable length: 7m	Cable length: 12m
		100%	42%	32%
 Unbreakable fiber	HPF-T024 Related pages P7	140mm	37mm	28mm
		Cable length: 2m	Cable length: 7m	Cable length: 12m
		100%	27%	20%
 Pipe-mounted liquid level	HPF-T032, T032E HPF-T034, T034E Related pages P32	Available*2	Available*2	Unavailable
		Cable length: 5m	Cable length: 10m	Cable length: 15m

Diffuse scan

Type	Model Number	Scanning distance and cable length when combined with fiber extender: HPX-AG (HP mode: 5 ms in response time)*1		
		No extender	HPF-EU05(5m)	HPF-EU10(10m)
 Standard fiber	HPF-D002 Related pages P9	400mm	170mm	125mm
		Cable length: 2m	Cable length: 7m	Cable length: 12m
		100%	43%	32%
 Heatproof	HPF-D023 Related pages P25	170mm	47mm	35mm
		Cable length: 1m	Cable length: 6m	Cable length: 11m
		100%	28%	21%
 Unbreakable fiber	HPF-D029 Related pages P9	25mm	8mm	6mm
		Cable length: 2m	Cable length: 7m	Cable length: 12m
		100%	33%	25%
 Liquid leakage	HPF-D040 Related pages P32	Available*2	Available*2	Unavailable
		Cable length: 5m	Cable length: 10m	Cable length: 15m
 Contact liquid level	HPF-D027 Related pages P31	Available*2	Available*2	Unavailable
		Cable length: 5m	Cable length: 10m	Cable length: 15m

*1 For combinations other than with HPX-AG, please contact us.

*2 Even where availability is indicated, detection may not be possible depending on the liquid. Please check operation before use.

Screw

Cylindrical

Coaxial

Sleeve

Side view

Narrow view

Flat/
Selective
reflection

Area

Heatproof

Chemical
-proof

Vacuum
-proof

Specialized
Use

Lens unit

Accessory

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List of Scanning
Distance by
Amplifier Model

List of scanning Distance by Amplifier Model

Thru scan



Model No.	Scanning distance (mm)											掲載頁
	HPX-AG						HPX-EG			HPX-H	HPX-A	
	HP	nL	SF	FT	HS	SH	nL	SF	FT	—	—	
HPF-T001	2,175	1,450	1,160	630	360	500	770	650	450	800	400	P7
HPF-T002	2,175	1,450	1,160	630	360	500	770	650	450	800	400	P11
HPF-T003	1,200	800	640	350	200	280	410	350	240	400	200	P7
HPF-T004	1,200	800	640	350	200	280	410	350	240	400	200	P11
HPF-T005	1,200	800	640	350	200	280	410	350	240	400	200	P15
HPF-T006	1,200	800	640	350	200	280	410	350	240	400	200	P15
HPF-T007	165	110	88	48	27	38	55	48	33	60	30	P17
HPF-T008	180	120	96	52	30	42	60	50	38	100	40	P7
HPF-T009	180	120	96	52	30	42	60	50	38	100	40	P11
HPF-T010	855	570	455	245	140	195	300	250	170	300	150	P7
HPF-T012	690	460	365	200	115	160	240	200	140	250	120	P25
HPF-T014	660	440	350	190	110	150	220	190	130	250	120	P25
HPF-T015	37	25	20	10	6	8	35	30	21	12	6	P15
HPF-T017	1,200	800	640	350	200	280	410	350	240	400	200	P25
HPF-T018	615	410	325	175	100	140	140	120	80	200	100	P25
HPF-T019	4,140	2,760	2,200	1,200	690	965	1400	1200	840	1500	750	P19
HPF-T020	4,500	3,000	2,400	1,310	750	1,050	1500	1300	920	1600	800	P19
HPF-T021	780	520	415	225	130	180	270	220	160	250	125	P23
HPF-T021T	3,600	2400	1,920	1,050	600	840	1200	1000	710	1100	550	P23
HPF-T021S	3,450	2300	1,840	1,000	575	800	1100	960	670	1200	600	P23
HPF-T021WT	3,600	3600	3,200	1,750	1,000	1,400	2000	1600	1100	2000	1000	P23
HPF-T023	3,600	2,400	1,920	1,050	600	840	1200	1000	730	1200	600	P19
HPF-T024	140	95	75	40	23	33	50	42	29	50	25	P7
HPF-T025	900	600	480	260	150	210	310	260	180	300	150	P7
NEW HPF-T025B	900	600	480	260	150	210	310	260	180	350	175	P7
HPF-T026	52	35	28	15	8	12	20	16	11	20	10	P17
HPF-T028	140	95	75	40	23	33	50	42	29	50	25	P21
HPF-T028LF	210	140	110	60	35	49	80	65	47	80	40	P21
HPF-T029	4,500	3,000	2,400	1,310	750	1,050	1500	1200	880	1500	750	P27
NEW HPF-T029E	825	550	440	240	135	190	280	230	160	270	150	P27
NEW HPF-T029H-L05	1400	930	740	410	230	180	410	330	180	460	230	P27
HPF-T030	500	500	500	305	175	245	310	260	180	350	175	P19
HPF-T031	900	600	480	260	150	210	310	260	180	300	150	P11
HPF-T032	—	—	—	—	—	—	—	—	—	—	—	P32
NEW HPF-T032E	—	—	—	—	—	—	—	—	—	—	—	P32
HPF-T033	900	600	480	260	150	210	280	240	160	265	130	P7
HPF-T034	—	—	—	—	—	—	—	—	—	—	—	P32
NEW HPF-T034E	—	—	—	—	—	—	—	—	—	—	—	P32
HPF-T035	1,030	690	550	300	170	240	350	300	210	340	170	P27
HPF-T036	18	12	9	5	3	4	6	5	3	6	3	P11
HPF-T037	52	35	28	15	8	12	20	16	11	20	10	P17
HPF-T038	37	25	20	10	6	8	12	10	7	12	6	P11
HPF-T039	18	12	9	5	3	4	5	4	3	6	3	P15
HPF-T040	37	25	20	10	6	8	12	10	7	12	6	P15
HPF-T042	660	440	350	190	110	150	220	190	130	240	120	P17
HPF-T043	300	200	160	85	50	70	100	80	55	100	50	P11
HPF-T044	675	450	360	195	110	155	220	190	130	220	110	P7
HPF-T045	1,200	800	640	350	200	280	410	350	240	400	200	P7
HPF-T046	180	120	96	52	30	42	60	50	38	100	40	P11
NEW HPF-T047	—	—	—	—	—	—	—	—	—	—	—	P31

Diffuse scan



Model No.	Scanning distance (mm)											掲載頁
	HPX-AG						HPX-EG			HPX-H	HPX-A	
	HP	nL	SF	FT	HS	SH	nL	SF	FT	—	—	
HPF-D001	530	400	320	170	85	130	210	180	120	230	120	P9
HPF-D002	400	300	240	130	65	100	150	130	90	150	80	P9
HPF-D003	400	300	240	130	65	100	150	130	90	150	80	P15
HPF-D004	105	80	64	34	17	26	43	36	25	40	20	P9
HPF-D005	105	80	64	34	17	26	43	36	25	40	20	P11
HPF-D006	105	80	64	34	17	26	43	36	25	40	20	P15
HPF-D009	400	300	240	130	65	100	150	130	90	150	80	P13
HPF-D010	86	65	52	28	14	21	35	30	21	40	20	P13
HPF-D011	40	30	24	13	6	10	17	14	10	15	8	P17
HPF-D012	250	190	150	80	40	60	100	80	55	100	50	P9
HPF-D013	190	190	160	85	43	65	100	80	55	100	50	P25
HPF-D014	170	130	100	55	28	43	70	60	42	50	50	P27
HPF-D015	160	160	140	75	39	60	85	70	50	90	30	P25
HPF-D018	200	150	120	65	32	50	75	65	46	80	40	P9
HPF-D019	20	16	12	6	2	4	4	3	2	4	2	P15
HPF-D021	86	65	52	28	14	21	35	30	21	40	20	P15
HPF-D022	400	300	240	130	65	100	150	130	90	150	80	P25
HPF-D023	170	130	100	55	28	43	70	60	42	50	50	P25
HPF-D024	170	130	100	55	28	43	70	60	42	50	50	P25
HPF-D025	20	20	20	20	20	20	28	24	16	20	20	P19
HPF-D026	265	200	160	85	43	65	100	90	60	100	50	P23
HPF-D027	—	—	—	—	—	—	—	—	—	—	—	P31
HPF-D028	2.5±0.5	2.5±0.5	2.5±0.5	2.5±0.5	—	—	—	—	—	—	—	P22
HPF-D028T	7.4±1.6	7.4±1.6	7.4±1.6	—	—	—	—	—	—	—	—	P22
HPF-D028F	5.2±1.6	5.2±1.6	5.2±1.6	—	—	—	—	—	—	—	—	P22
HPF-D029	25	19	15	8	4	6	10	8	5	10	5	P9
HPF-D030	210	160	125	69	34	53	85	70	50	80	40	P9
HPF-D031	25	19	15	8	4	6	10	8	5	10	5	P15
HPF-D032	46	35	28	15	7	11	18	15	10	18	10	P13
NEW HPF-D032B	46	35	28	15	7	11	18	15	10	18	10	P13
HPF-D033	—	—	—	—	—	—	—	—	—	—	—	P31
HPF-D034	60	45	36	19	9	15	25	21	15	25	13	P13
HPF-D035	95	95	80	43	21	33	50	42	29	50	25	P13
NEW HPF-D035C	95	95	80	43	21	33	50	42	29	50	25	P13
HPF-D036	20	15	12	6	3	5	8	7	5	8	4	P11
HPF-D037	20	15	12	6	3	5	8	7	5	8	4	P9
HPF-D038	95	95	80	43	21	33	50	42	29	50	25	P13
HPF-D039	20	16	12	6	2	4	4	3	2	4	2	P15
HPF-D040	—	—	—	—	—	—	—	—	—	—	—	P32
HPF-D041	40	30	24	13	6	10	17	14	10	15	8	P17
HPF-D042	86	65	52	28	14	21	35	30	21	40	20	P13
HPF-D043	160	120	96	52	25	40	65	55	40	50	32	P17
HPF-D044	210	160	125	69	34	53	85	70	50	80	40	P11
HPF-D045LF	93	70	56	30	15	23	37	31	21	34	18	P21

Screw

Cylindrical

Coaxial

Sleeve

Side view

Narrow view

Flat/
Selective
reflection

Area

Heatproof

Chemical
-proof

Vacuum
-proof

Specialized
Use

Lens unit

Accessory

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List of Scanning
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Amplifier Model

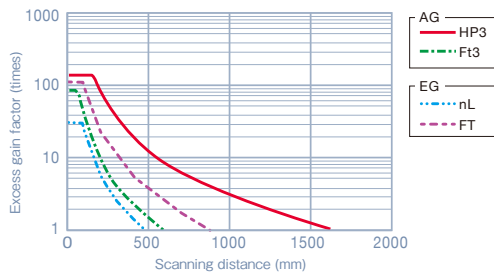
Characteristics diagrams (typical examples)

Excess gain



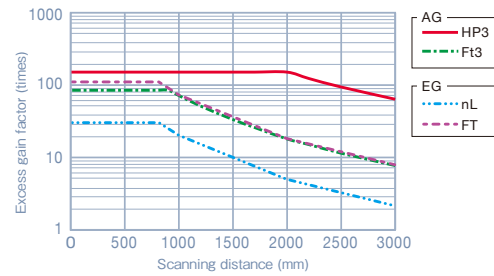
HPF-T003

Related pages [P7](#)



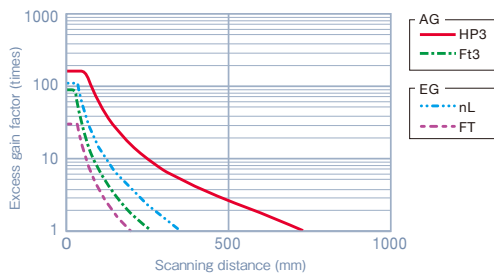
HPF-T003/FE-PA-L1

Related pages [P7](#), [P35](#)



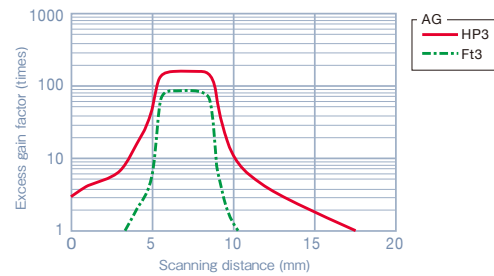
HPF-D002

Related pages [P9](#)



HPF-D028T

Related pages [P22](#)

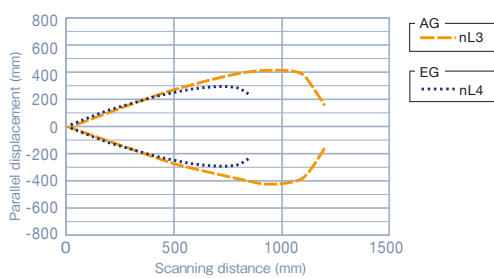


Parallel displacement



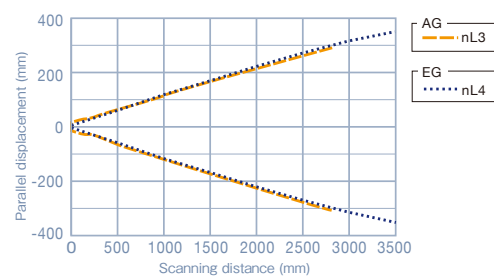
HPF-T003

Related pages [P7](#)



HPF-T003/FE-PA-L1

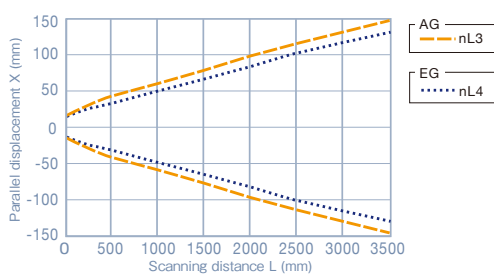
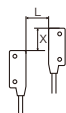
Related pages [P7](#), [P35](#)



HPF-T021T

(Right and left detection)

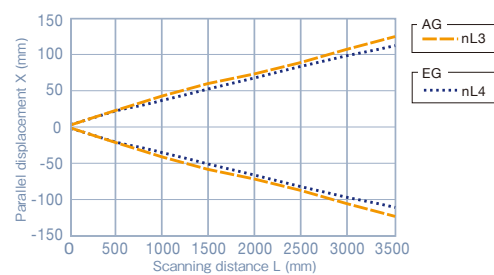
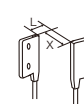
Related pages [P23](#)



HPF-T021T

(Up and down detection)

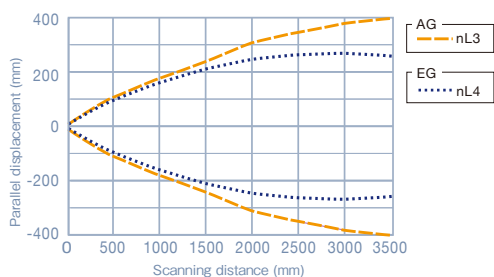
Related pages [P23](#)





HPF-T029

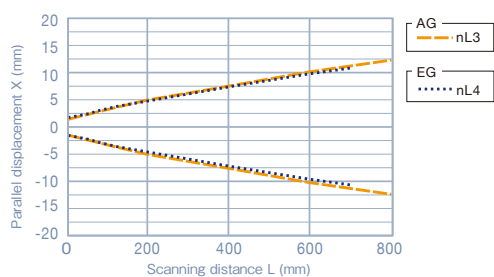
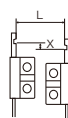
Related pages [P27](#)



HPF-T030

(Right and left detection)

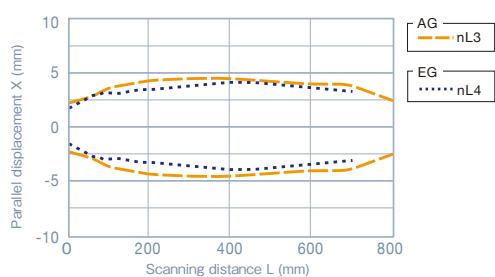
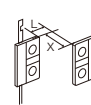
Related pages [P19](#)



HPF-T030

(Up and down detection)

Related pages [P19](#)

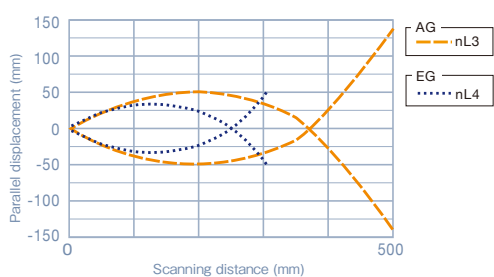


Detection area characteristics



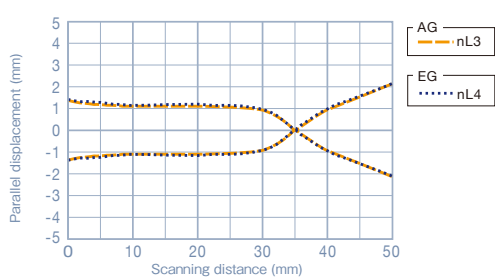
HPF-D002

Related pages [P9](#)



HPF-D025

Related pages [P19](#)



Screw

Cylindrical

Coaxial

Sleeve

Side view

Narrow view

Flat/
Selective
reflection

Area

Heatproof

Chemical
-proof

Vacuum
-proof

Specialized
Use

Lens unit

Accessory

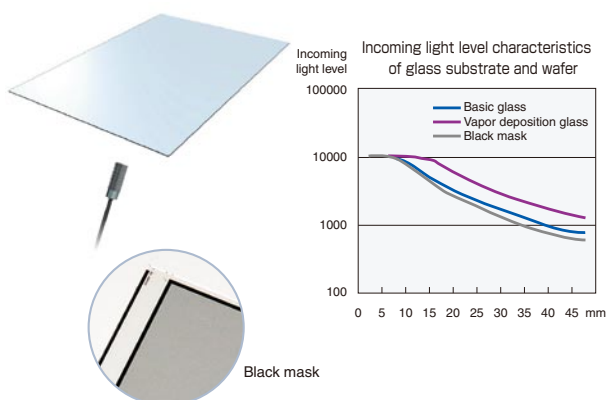
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List of Scanning
Distance by
Amplifier Model

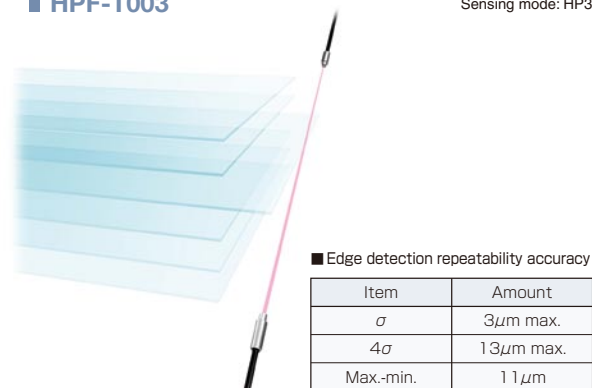
Reference data for target detection

(Be sure to test using an actual target object.)

Standard diffuse scan fiber unit Glass substrate HPF-D002 Sensing mode: HP3

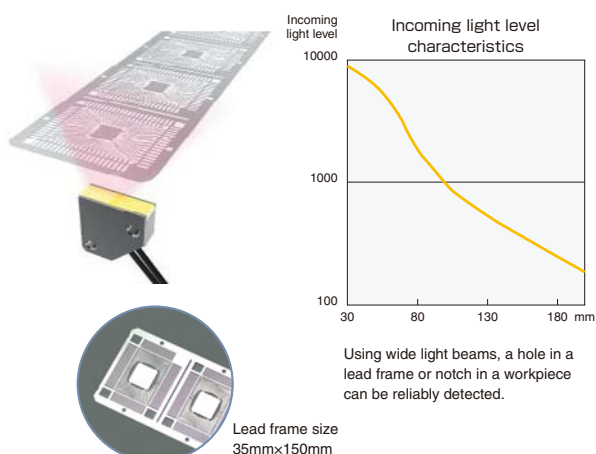


Standard thru scan fiber unit Glass substrate HPF-T003 Sensing mode: HP3

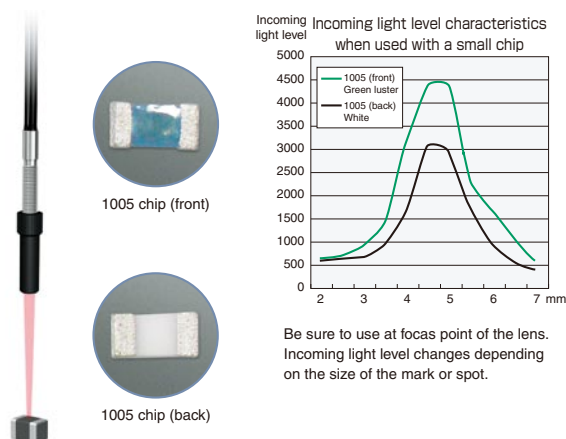


On remote tuning models, if tuning is repeated before sensing, the repetition accuracy can be further increased.

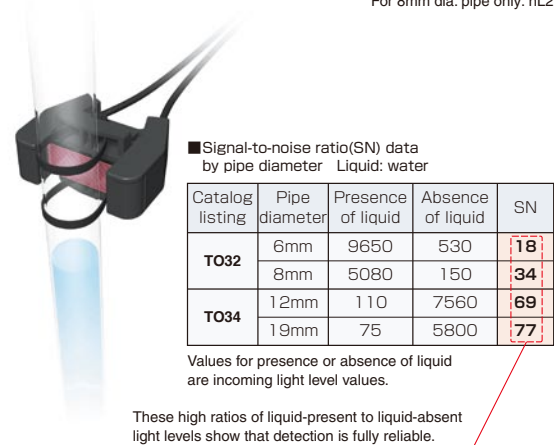
Fiber unit with diffuse scan array Lead frame HPF-D026 Sensing mode: HP3



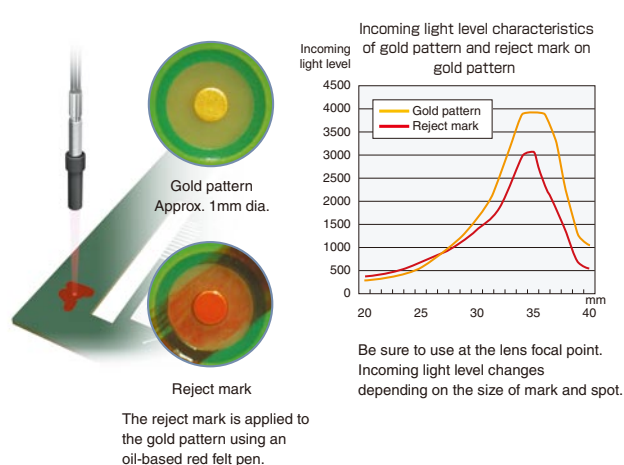
Coaxial diffuse scan fiber unit Small chip HPF-D034/HPF-LU07 Sensing mode: SF3



Pipe-mounted fiber-optic liquid-level Liquid-level in pipe HPF-T032/T034 Sensing mode: nL3 For 8mm dia. pipe only: nL2



Coaxial diffuse scan fiber unit Reject mark HPF-D038/HPF-LU08 Sensing mode: FT3



Screw	Cylindrical	Coaxial	Sleeve	Side view	Narrow view	Flat/ Selective reflection	Area	Heatproof	Chemical -proof	Vacuum -proof	Specialized Use	Lens unit	Accessory
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Please read the "Terms and Conditions" from the following URL before ordering or use:

<http://www.yamatake.com/products/bi/order.html>

Specifications are subject to change without notice.

azbil

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Advanced Automation Company

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Kanagawa 251-8522 Japan
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(JBA)

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