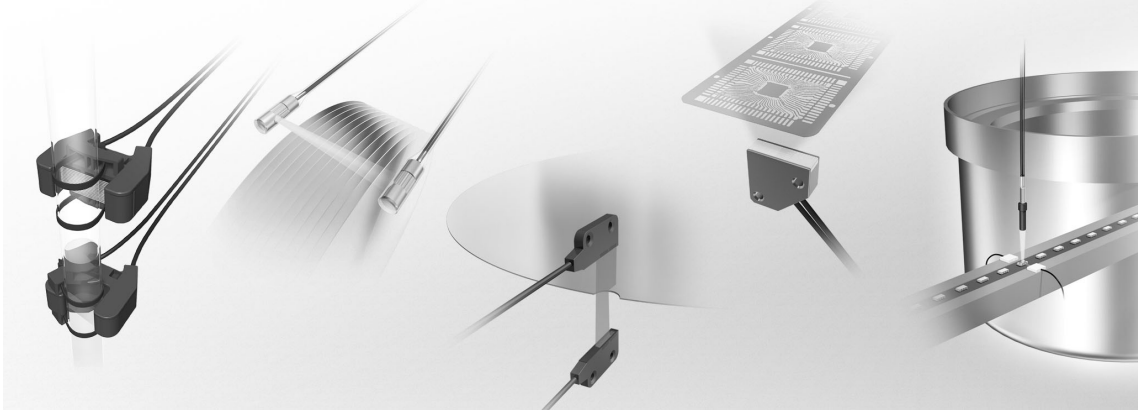



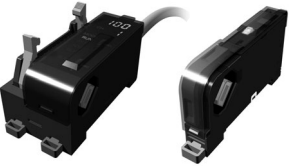


Fiber Units

HPF Series

Wide range of models for various applications and environments



COMPATIBLE AMPLIFIERS

Type	Catalog listing	Appearance
Digital fiber-optic sensors	HPX-AG	
Gang-mounted distributed remote cluster	HPX-ET	
General use AUTO-tuning	HPX-T	
General use, potentiometer tuning	High sensitivity	HPX-H
	Low hysteresis	HPX-A
	High-speed	HPX-F
	Mark detection	HPX-V
Analog output	HPX-MA	

Note: For amplifier details, refer to the section on the relevant amplifier.

A VARIETY OF FIBER UNITS

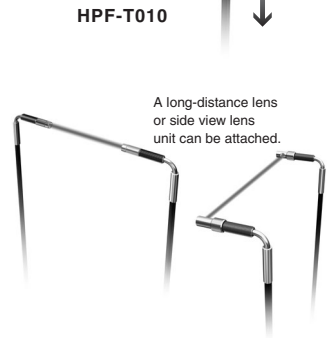
Space saving flat and elbow fiber units

Even in a small mounting space, flexible wiring is possible with this unbreakable fiber.



Selection guide

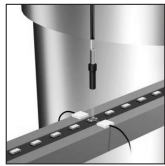
Model	Appearance	Features	Bend radius (mm)	Catalog listing
Space-saving thru scan	Core: 1mm dia. (1) M4	2m Free cut	R20	HPF-T010
	Core: 0.5mm dia. (1)		R1	HPF-T028
	Core: 1mm dia. (1)		R5	HPF-T028LF
Space-saving diffuse scan	Core: 1mm dia. (2)		R2	HPF-D045LF



Coaxial diffuse scan fiber unit and micro-spot lens

13 different combinations

Small target objects, marks, etc. can be reliably detected using a micro-spot light (0.1mm dia.). Since the red spot has high visibility, it is easy to position.

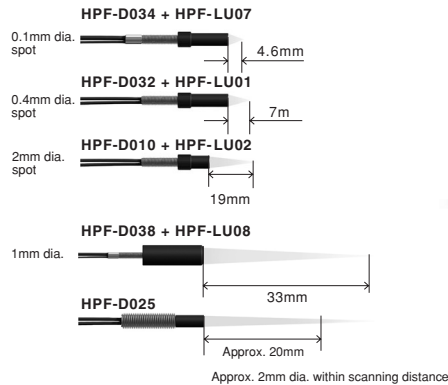


Chip front/back discrimination



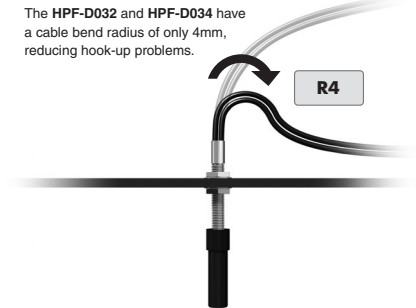
Reject mark detection on a substrate

Typical examples of combinations

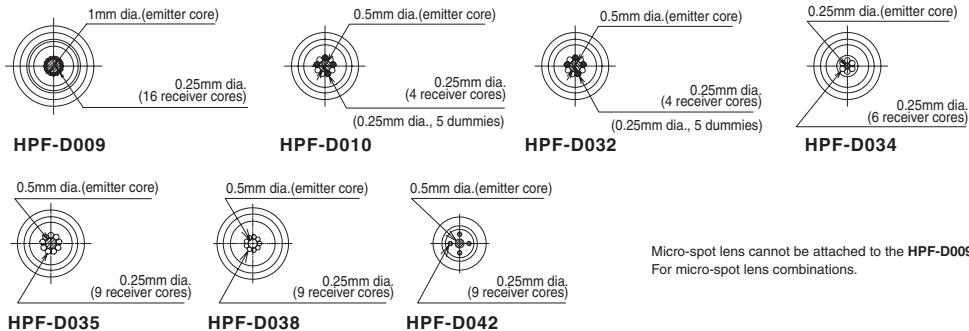


HPF-D032 / HPF-D034

The HPF-D032 and HPF-D034 have a cable bend radius of only 4mm, reducing hook-up problems.



Coaxial diffuse scan fiber unit and light axis structure



Micro-spot lens cannot be attached to the HPF-D009, HPF-D042. For micro-spot lens combinations.

● Pipe-mounted fiber-optic liquid-level sensors HPF-T032 / HPF-T034

Fail-safe detection uses 2 different sensing methods for detection of upper and lower limits of tank liquid level.

Upper limit detection
Light circuit is closed when liquid is absent.

Lower limit detection
Light circuit is closed when liquid is present.

A 16-axis array of light beams eliminates the effects of air bubbles and water droplets.

Adverse effects from air bubbles and water droplets are reduced, resulting in reliable detection.



Selection guide

Model	Appearance	Pipe diameters	Features	Bend radius (mm)	Catalog listing	
Liquid level detection		3 to 13mm	Receives light when liquid present	5m Cut to length	R4	HPF-T032
		8 to 19mm	Receives light when liquid absent			HPF-T034

● Liquid leak fiber-optic detector HPF-D040



Body and cable are protected by PFA

Sensor can be used even in environments like IPA and other organic solvents. SUS is partially used for bracket.

Selection guide

Model	Appearance	Features	Bend radius (mm)	Catalog listing
Liquid leak detection		5m Cut to length	R20	HPF-D040

● Fiber-optic sensors for tank level detection HPF-D027 / HPF-D033

All-resin structure ensures no metal contamination.

Fluorine resin chemical resistance

Chemical	Resistant
Acetone: (CH ₃) ₂ CO	○
Dilute hydrochloric acid: HCl	○
Ammonia: NH ₃	○
Ethanol: C ₂ H ₅ OH	○

Withstands
105°C
R30 2m
Cut to length



Selection guide

Model	Appearance	Features	Bend radius (mm)	Catalog listing
Liquid level detection, 6mm dia. type		Contact type Liquid cling prevention Heat resistant to 105°C	Cut to length R25/R40	HPF-D027
Liquid level detection, 4mm dia. type			Cut to length R15/R30	HPF-D033

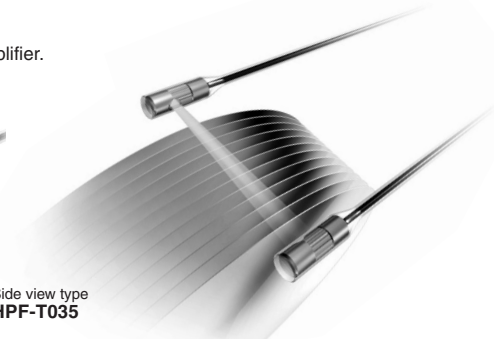
● Chemical-proof fiber units

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

HPF-T029



Side view type
HPF-T035



Selection guide

Model	Appearance	Features	Bend radius (mm)	Catalog listing
Thru scan Oil and chemical-proof Small diameter	4.7mm dia.	Fluorine resin fiber Cut to length	R20	HPF-T029*
Thru scan Oil and chemical-proof Side view Small diameter	4.7mm dia.	Fluorine resin fiber Cut to length	R20	HPF-T035*
Diffuse scan Oil and chemical-proof	6mm dia.	Fluorine resin fiber Cut to length	R20/R80	HPF-D014

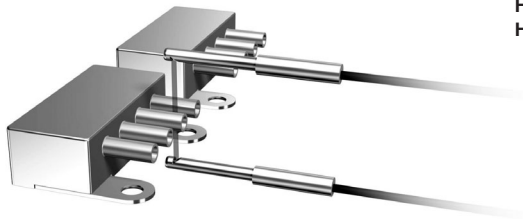
Notes: HPF-T029/HPF-T035: Standard length is 2m. However, 5m size is also available. For details, contact Yamatake Corporation.

● Fine diameter fiber unit

HPF-T037

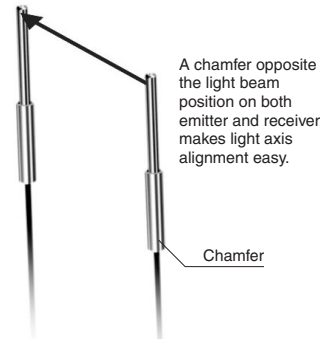


Light axis position
of side view type



■ Side view type: Light axis and chamfer

HPF-T007
HPF-T037



A chamfer opposite the light beam position on both emitter and receiver makes light axis alignment easy.

Chamfer

Selection guide

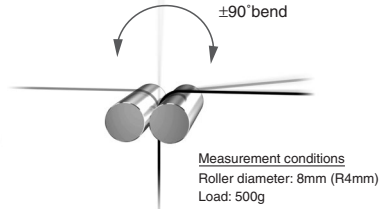
Model	Appearance	Features	Bend radius (mm)	Catalog listing
Thru scan	Sleeve: 0.5 dia. Core: 0.25mm dia. (1)	Fine diameter sleeve Cut to length/2m	R15	HPF-T015
	 Core: 0.125mm dia. (1) 1.5 dia.	Fine diameter		HPF-T036
	 Core: 0.25mm dia. (1) 1.0 dia.	Fine diameter Connector/0.5m	R10	HPF-T038
	Sleeve: 0.4 dia. Core: 0.25mm dia. (1)	Fine diameter sleeve	R15	HPF-T039
	Sleeve: 0.4 dia. Core: 0.25mm dia. (1)	Fine diameter sleeve Cut to length/2m		HPF-T040
Thru scan side view	 Core: 0.88mm dia. (1) 2.5 dia.	Fine diameter sleeve Cut to length/1m	R5	HPF-T037
Diffuse scan	Sleeve: 1.5 dia. Core: 0.5mm dia. (2)	Fine diameter sleeve Cut to length/2m	R15	HPF-D021
	Sleeve: 0.82 dia. Core: 0.25mm dia. (2)	Fine diameter Cut to length/0.5m		HPF-D019

● Bend-tolerant fiber-optic cable R4

For use on moving equipment



■ Repetitive bending test (reference)



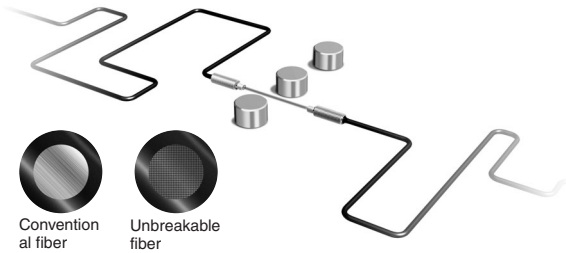
The HPF-T008 and HPF-T009 do not break even after 1 million operations under the above test conditions.

Detection method	Size	Bend radius (mm)	Catalog listing
Thru scan	M3	R4	HPF-T008
	1.5mm dia.		HPF-T009
	M4		HPF-T033
Diffuse scan	M6	R4	HPF-D012
	1.5mm dia.		HPF-D036
	M3		HPF-D037

● Unbreakable fiber-optic cable (stationary bend type) R1/R2

Because it is made of several hundred bundled fibers, there is no light level drop when the cable is bent.

Even if the cable is bent at a small radius, the light level doesn't change

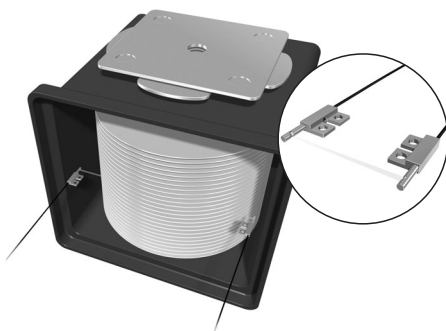


Detection method	Size and shape	Bend radius (mm)	Catalog listing
Thru scan	M3	R1	HPF-T024
	M4	R2	HPF-T025
	2.5mm dia., side view sleeve	R1	HPF-T026
Diffuse scan	M3	R1	HPF-D029
	M6	R2	HPF-D030
	M4, sleeve	R1	HPF-D031

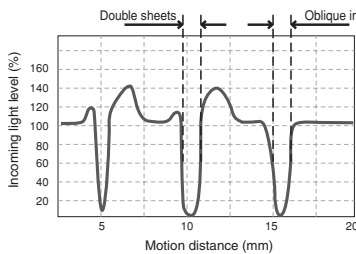
For use on a moving unit, bend-tolerant fiber-optic cable is recommended.

● Mapping fiber-optic sensor HPF-T030

Ultra narrow light beam:
aperture angle of $-1.5^{\circ}/+1.5^{\circ}$ max.

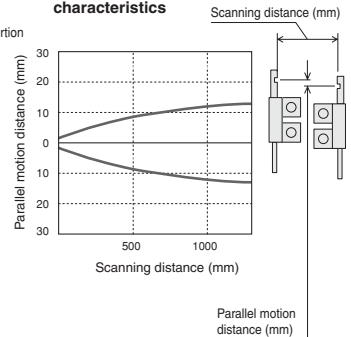


Wafer mapping waveform



Reading is 100% with no wafer present.

Parallel motion distance characteristics



Fewer man-hours needed for light axis alignment

For a narrow width light, light axis alignment is generally difficult and takes a long time. However, since this model is shipped with the mechanical axis alignment set to $-0.8^{\circ}/+0.8^{\circ}$ max. at 500mm scanning distance, the man-hours required for mounting and adjustment can be greatly reduced.

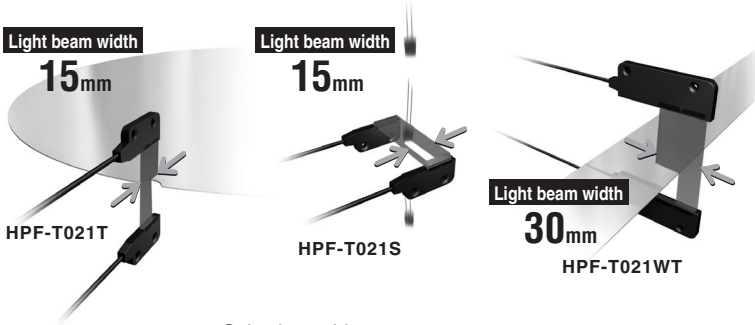
Model	Appearance	Features	Bend radius (mm)	Catalog listing
Mapping fiber-optic sensor		Narrow beam, $-1.5^{\circ}/+1.5^{\circ}$ max. Cut to length Free cut	R5	HPF-T030

Note: Since the scanning distance is set at the distance used in shipping inspection, it may differ from the actual scanning capability.

● Wide Beam Fiber Unit

HPF-T021T / HPF-T021S / HPF-T021WT

Three choices of light beam width and detection type ensure that meandering or part size can be detected.



Comparison of light beam widths of wide beam fiber units

Light beam width	Catalog listing
5.25mm	HPF-T021
7×0.5mm	HPF-T021T (with an attached slit sticker)
11×2mm	HPF-T021T (with an attached slit sticker)
15×2mm	HPF-T021T HPF-T021S
20×0.5mm	HPF-T021WT (with an attached slit sticker)
30×2mm	HPF-T021WT

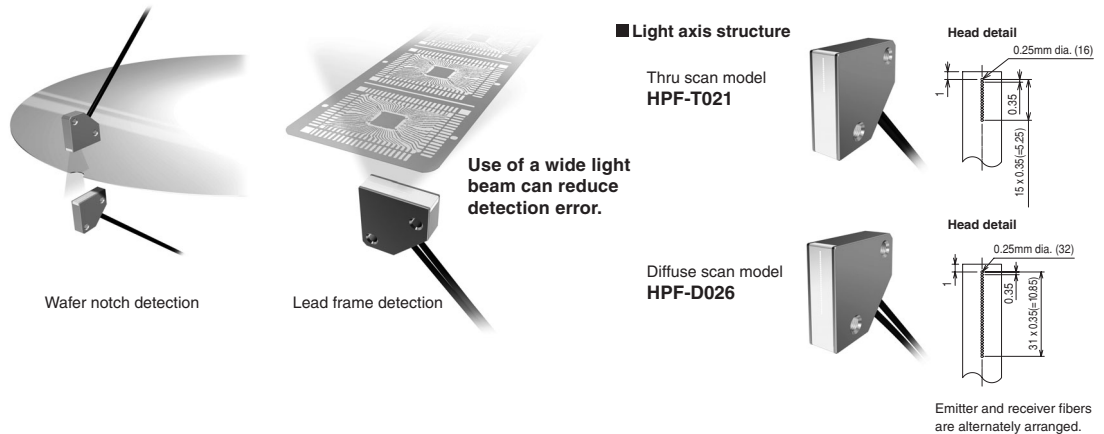
Selection guide

	Model	Features	Cable length (cuttable)	Bend radius	Catalog listing
Thru scan	Wide beam	Beam 15mm wide	Free cut 2m	R15	HPF-T021T
		Beam 15mm wide Side beam			HPF-T021S
		Beam 30mm wide			HPF-T021WT

● Fiber-optic arrays

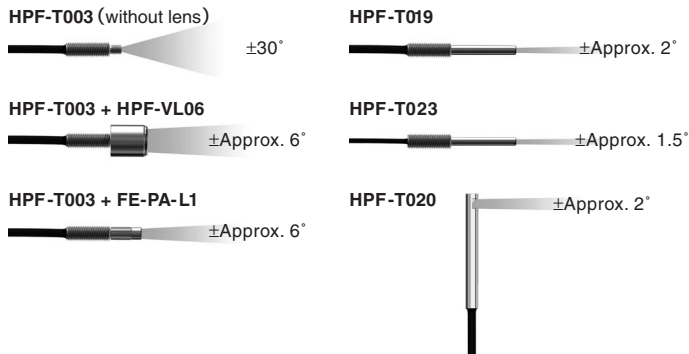
HPF-T021 / HPF-D026

Using an array of 16 light beams, the target object's position, dispersion, opening or notch can be reliably detected.



● Thru scan lens attachment with a narrow beam unit

By using a single integrated structure with a lens attachment for long scanning distance and light focusing, diffuse reflection can be prevented.



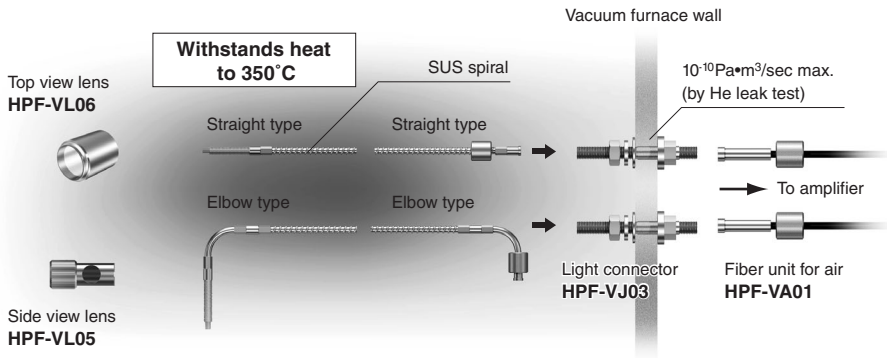
Catalog listing	Scanning distance in HP3 mode (HPX-AG)
HPF-T003 + HPF-VL06	14m
HPF-T003 + FE-PA-L1	8,400mm
HPF-T019	4,800mm
HPF-T020	5,300mm
HPF-T023	3,600mm

● Fiber units for vacuum use

Suitable for use in a vacuum and in high temperatures (to 350°C)

HPF-V Series

HPF-V Series fiber units for vacuum applications can be used in a vacuum and in high-temperature environments. When detection through a view port with thru-scan models is unreliable or when a facing view port cannot be installed, the HPF-V Series can be used inside the vacuum chamber.



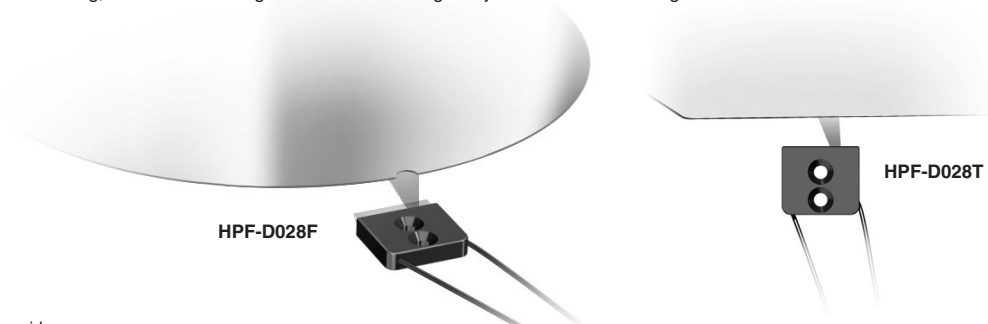
Selection guide

Model	Appearance	Features	Bend radius (mm)	Catalog listing
Thru scan		Heat resistant to 350°C Elbow connection	R25	HPF-VT07
Diffuse scan		Heat resistant to 350°C Elbow connection	R25	HPF-VD07
		Heat resistant to 350°C Straight connection	R25	HPF-VD09
Light connector		Heat resistant to 200°C (2 units)	—	HPF-VJ03
Fiber unit for air		For air (2 units) Cut to length	R20	HPF-VA01
Side view lens		Heat resistant to 350°C (2 units)	—	HPF-VL05
Top view lens		Long distance lens Heat resistant to 350°C (2 units)	—	HPF-VL06

● Limited diffuse scan fiber units

HPF-D028T / HPF-D028F

Reliable sensing, with almost no negative effects from target object conditions or background.

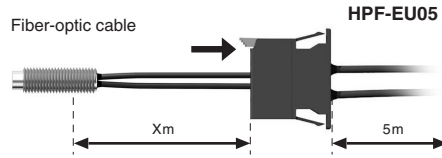
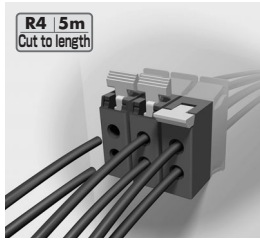


Selection guide

Model	Appearance	Features	Bend radius (mm)	Catalog listing
Limited diffuse scan		Limited diffuse scan	Free cut 2m	HPF-D028
				R15
				HPF-D028F

● "Extension cord" for fiber-optic cables

Cables can be extended 5m using the **HPF-EU05** fiber-optic extender, sold separately.



When the fiber-optic extender is used, there is a light level drop due to the cable length and the connecting portion. Since the **HPF-EU05** cannot be used with every type of fiber unit, contact Yamatake Corporation about specific applications.

Allowable plate thickness for mounting: 1 to 2 mm

● Fiber unit customization services

Various services such as emergency sensor addition, change, sample production and on-site evaluation are available.

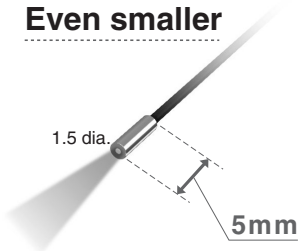
Examples There are many other ways in which fiber units can be customized.

Thru-scan type, small head

Limited diffuse scan type, ultra thin type

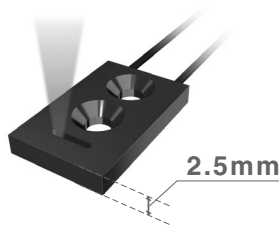
Coaxial diffuse scan type, ultra small diameter sleeve

Even smaller



Note: Our smallest standard model is 10 mm.

Even thinner



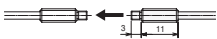
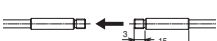
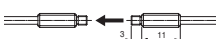


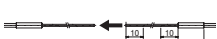

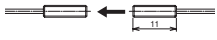
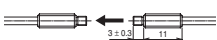


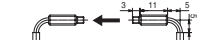

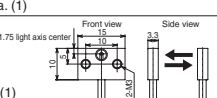
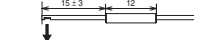

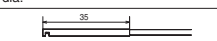

Note: Our thinnest standard model is 3 mm.

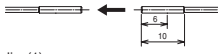
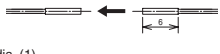
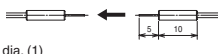
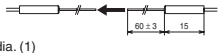



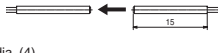
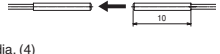
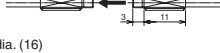
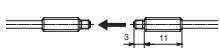
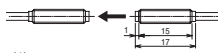
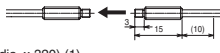

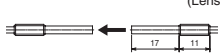


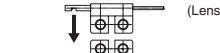
Even narrower



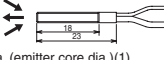
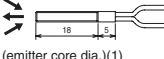
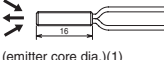

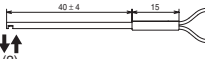
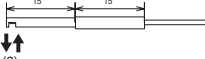
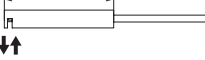

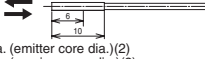
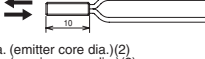
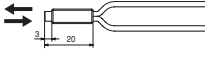
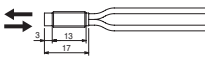
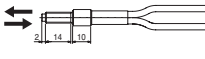
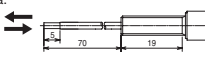
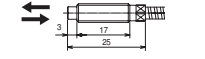
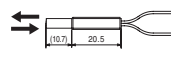
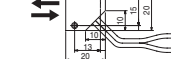
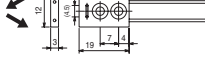
FIBER UNIT

Thru scan















Group	Appearance	Features	Cable length (cuttable)	Bend radius	Catalog listing
Long distance	 <p>Core: 1.4 dia. (1) M4</p>	Long scanning distance	Cut to length 2m	R20	HPF-T001
	 <p>Core: 1.4 dia. (1) 3 dia.</p>				HPF-T002
Standard	 <p>Core: 1 dia. (1) M4 Sleeve 1.2 dia. Lens</p>	Standard	Cut to length 2m	R20	HPF-T003
	 <p>Core: 1 dia. (1) 3 dia. Lens</p>				HPF-T004
	 <p>Core: 1 dia. (1) M4</p>	Sleeve (flexible)		R10/R20	HPF-T005
	 <p>Core: 1 dia. (1) 3 dia.</p>				HPF-T006
	 <p>Core: 1 dia. (1) M3</p>	Standard diameter and compact		R20	HPF-T045
	Ultra bend - tolerant	 <p>Core: 0.5 dia. (1) M3</p>		Static installation, flexible, and small diameter	Cut to length 2m
 <p>Core: 1 dia. (1) M4 Lens</p>		Static installation, flexible, and standard model	R2	HPF-T025	
 <p>Core: 1 dia. (1) 3 dia.</p>				HPF-T031	
 <p>Sleeve 1 dia. 2.5 dia.</p>		Static installation, flexible, and side view model	R1	HPF-T026	
Space saving	 <p>Core: 1 dia. (1) M4 Lens</p>	Elbow	Cut to length 2m	R20	HPF-T010
	 <p>Core: 0.5 dia. (1)</p>	Static installation, flexible, small diameter, and flat top view model		R1	HPF-T028
	 <p>Core: 1 dia. (1)</p>	Static installation, flexible, standard, and flat side view model		R5	HPF-T028LF
Side view	 <p>Sleeve 1 dia. 2.5 dia.</p>	Small diameter sleeve	Cut to length 2m	R15	HPF-T007
	 <p>Sleeve 0.88 dia. 2.5 dia.</p>	Fine diameter sleeve	Cut to length 1m	R5	HPF-T037
	 <p>Sleeve 0.88 dia. 3 dia.</p>	Standard diameter	Cut to length 2m	R20	HPF-T042
Small diameter	 <p>Sleeve 0.5 dia. Core: 0.25 dia. (1) 3 dia.</p>	Fine diameter	Cut to length 2m	R15	HPF-T015

Group	Appearance	Features	Cable length (cuttable)	Bend radius	Catalog listing	
Small diameter	 Core: 0.125 dia. (1) 1.5 dia.	Fine diameter	Connector 0.5m	R15	HPF-T036	
	 Core: 0.25 dia. (1) 1.0 dia.				HPF-T038	
	 Sleeve 0.4 dia. Core: 0.125 dia. (1) 2.5 dia.	Fine diameter sleeve			HPF-T039	
	 Sleeve 0.4 dia. Core: 0.25 dia. (1) 3 dia.	Fine diameter sleeve			HPF-T040	
	 Core: 0.5 dia. (1) 2 dia.	Small diameter			Cut to length 2m	HPF-T043
	 Core: 0.75 dia. (1) M3	Small diameter and long scanning distance			HPF-T044	
	Elastic	 Core: 0.25 dia. (4) M3			Elastic small diameter	Cut to length 2m
 Core: 0.25 dia. (4) 1.5 dia.		HPF-T009				
 Core: 0.25 dia. (4) 1.5 dia.		HPF-T046				
 Core: 0.25 dia. (16) M4		Elastic standard diameter	HPF-T033			
Heat resistant	 Core: 1 dia. (1) M4	To 105°C	Cut to length 2m	R25	HPF-T012	
	 Core: 1.5 dia. (1) M4	To 150°C			R35	HPF-T017
	 Glass fiber: 1 dia. (0.05 dia. x 320) (1) M4	To 200°C	Connector 1m	R15	HPF-T018	
	 Glass fiber: 0.05 dia. (0.05 dia. x 370) M4	Heat and cold resistant from -60°C to +350°C	Connector 2m	R25	HPF-T014	
Narrow beam	 (Lens incorporated) M4	Parallel beam top view	Cut to length 2m	R20	HPF-T019	
	 (Lens incorporated) 4 dia.	Parallel beam side view			HPF-T020	
	 (Lens incorporated) M4	Narrow beam top view		R15	HPF-T023	
Mapping	 (Lens incorporated) Core: 1.5 dia. (1)	Narrow beam -1.5/+1.5 max. side view	Cut to length 2m	R5	HPF-T030	

Group	Appearance	Features	Cable length (cuttable)	Bend radius	Catalog listing
Wide beam		Array	Cut to length 2m	R4	HPF-T021
		Beam 15mm wide		R15	HPF-T021T
		Beam 15mm wide Side Beam			HPF-T021S
		Beam 30mm wide			HPF-T021WT

Group	Appearance	Features	Cable length (cuttable)	Bend radius	Catalog listing
Coaxial	 <p>Core: 0.25 dia. (emitter core dia.)(1) Core: 0.25 dia. (receiver core dia.)(6)</p>	Lens M3	Connector 0.5m	R4	HPF-D034
	 <p>Core: 0.5 dia. (emitter core dia.)(1) Core: 0.25 dia. (receiver core dia.)(9)</p>	Lens M3	Cut to length 2m	R15	HPF-D035
	 <p>Core: 0.5 dia. (emitter core dia.)(1) Core: 0.25 dia. (receiver core dia.)(9)</p>	Lens M4			HPF-D038
	 <p>Core: 0.5 dia. (emitter core dia.)(1) Core: 0.25 dia. (receiver core dia.)(9)</p>	Sleeve 2 dia. 3 dia.	Small diameter coaxial		HPF-D042
Side view	 <p>Sleeve 2 dia. Core: 0.5 dia. (2)</p>	3 dia.	Cut to length 2m	R15	HPF-D011
	 <p>Sleeve 2 dia. Core: 0.5 dia. (2)</p>	2.8 dia.			HPF-D041
	 <p>Core: 0.5 dia. (2)</p>	6 dia.	Standard diameter	R20	HPF-D043
Elastic	 <p>Core: 0.25 dia. (emitter core dia.)(16) Core: 0.25 dia. (receiver core dia.)(16)</p>	M6	Cut to length 2m	R4	HPF-D012
	 <p>Core: 0.25 dia. (emitter core dia.)(2) Core: 0.25 dia. (receiver core dia.)(2)</p>	1.5 dia.	Connector 1m		HPF-D036
	 <p>Core: 0.25 dia. (emitter core dia.)(2) Core: 0.25 dia. (receiver core dia.)(2)</p>	M3	Cut to length 2m		HPF-D037
Heat resistant	 <p>Core: 1 dia. (2)</p>	M6	Cut to length 2m	R25	HPF-D013
	 <p>Core: 1.5 dia. (2)</p>	M6		R35	HPF-D022
	 <p>Glass fiber: 1.4 dia.</p>	M6	Connector 1m	R15	HPF-D023
	 <p>Sleeve 2.1 dia. Glass fiber: 1.4 dia.</p>	M6			HPF-D024
	 <p>Glass fiber: 1.5 dia.</p>	M6	Connector 2m	R25	HPF-D015
Parallel beam	 <p>(Built-in lens)</p>	M5	Cut to length 2m	R15	HPF-D025
Wide beam			Cut to length 2m	R4	HPF-D026
Limited reflection			Cut to length 2m	R15	HPF-D028

ATTACHMENTS (sold separately)

Name	Appearance	Features and applications	Applicable fiber unit	Catalog listing
Micro-spot (0.4mm dia.) lens unit		When lens is attached to a diffuse scan fiber unit, light converges to a spot 0.4mm in dia. at a distance of 7mm.	HPF-D010, HPF-D034, etc.	HPF-LU01
Long-distance micro-spot lens unit		When lens is attached to a diffuse scan fiber unit, light converges to a spot 2mm in dia. at a distance of 19mm.	HPF-D010, HPF-D034, etc.	HPF-LU02
Ultra micro-spot (0.1mm dia.) lens unit		When lens is attached to a diffuse scan fiber unit, light converges to a spot 0.1mm in dia. at a distance of 4.6mm.	HPF-D010, HPF-D034, etc.	HPF-LU07
Long distance spot lens unit		When lens is attached to the HPF-D038, light converges to a spot 1.0mm in dia. at a distance of 33mm.	HPF-D038	HPF-LU08
Long-distance lens unit (2 units)		Increases scanning distance 6-fold when attached to the light emitter and receiver of a thru-scan fiber unit. Heat resistant to 200°C.	HPF-T003, HPF-T004 HPF-T010, HPF-T012 HPF-T014, HPF-T018	FE-PA-L1
Side view unit (2 units)		When attached to the light emitter and receiver of a thru scan fiber unit, converts the unit to the side view type.	HPF-T003, HPF-T004 HPF-T010, HPF-T012 HPF-T014, HPF-T018	FE-PA-S1
Thru scan ultra long distance lens unit (2 units)		Heat resistant to 350°C. This unit can be also used for vacuum applications.	HPF-T003, HPF-T014 HPF-VT07, etc.	HPF-VL06
Thru scan side view lens unit (2 units)		Heat resistant to 350°C. This unit can be also used for vacuum applications.	HPF-T003, HPF-T014 HPF-VT07, etc.	HPF-VL05
Adjustable angle fiber bracket		Can be used with a thru scan fiber unit used as a limited reflection model, or with a side view model.	Thru scan fiber unit	HPX-PA06
Fiber-optic cable extender		This unit is a 5m long fiber optic cable relay unit.	—	HPF-EU05
Fiber head mounting bracket		For mounting a fiber unit head.	Fiber head size M3	FE-PA-FB1
			Fiber head size M4	FE-PA-FB2
			Fiber head size M6	FE-PA-FB4
Small diameter adapter for 1.0mm dia. fiber		This unit is an adapter for 1.0mm dia. fiber (an accessory for applicable fibers).		HPF-AT10
Small diameter attachment for 1.3mm dia. fiber		This unit is an adapter for 1.3mm dia. fiber (an accessory for applicable fibers).		HPF-AT13
Fiber cutter		Used to cut fibers to length (an accessory for applicable fibers).		FE-PA-F1

EXTERNAL DIMENSIONS OF FIBER UNITS

Thru scan (unit: mm)

Allowable bend radius

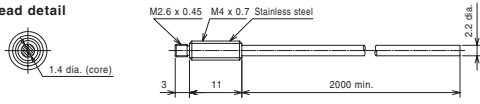
Ambient operating temperature

Scanning distance (HP mode)

HPF-T001

R20 -30 to +70°C 2,230mm Cut to length CAD file No. HP-2013

Head detail

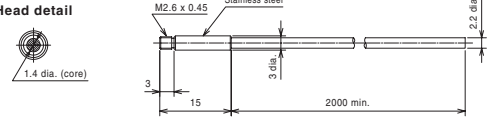


Nut and washer: B type

HPF-T002

R20 -30 to +70°C 2,230mm Cut to length CAD file No. HP-2014

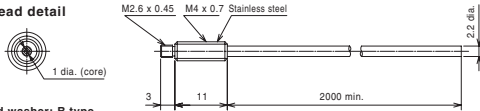
Head detail



HPF-T003

R20 -30 to +70°C 1,200mm Cut to length CAD file No. HP-2015

Head detail

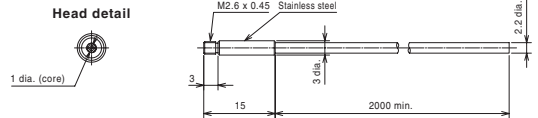


Nut and washer: B type

HPF-T004

R20 -30 to +70°C 1,200mm Cut to length CAD file No. HP-2016

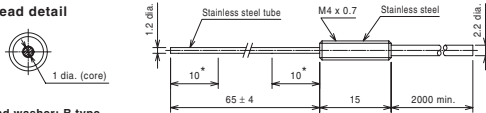
Head detail



HPF-T005

Fiber SUS tube R20/R10 -30 to +70°C 1,200mm Cut to length CAD file No. HP-2017

Head detail



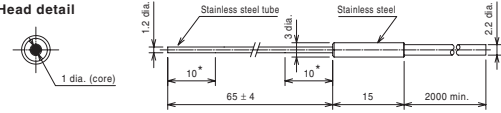
Nut and washer: B type

*Bending not allowed

HPF-T006

Fiber SUS tube R20/R10 -30 to +70°C 1,200mm Cut to length CAD file No. HP-2018

Head detail

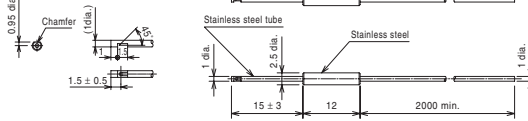


*Bending not allowed

HPF-T007

R15 -30 to +70°C 145mm Cut to length CAD file No. HP-2019

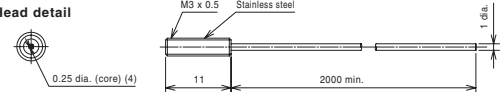
Head detail



HPF-T008

R4 -30 to +70°C 180mm Cut to length CAD file No. HP-2020

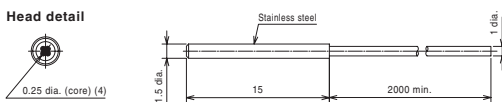
Head detail



HPF-T009

R4 -30 to +70°C 180mm Cut to length CAD file No. HP-2021

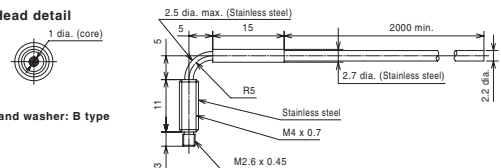
Head detail



HPF-T010

R20 -30 to +70°C 865mm Cut to length CAD file No. HP-2022

Head detail



Nut and washer: B type

HPF-T012

R25

-30 to +105°C

700mm

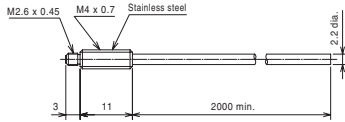
Cut to length

CAD file No. HP-2015

Head detail



Nut and washer: B type



HPF-T014

R25

-60 to +350°C

660mm

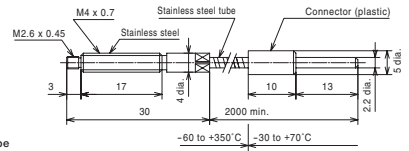
Cut to length

CAD file No. HP-2024

Head detail



Nut and washer: B type



HPF-T015

R15

-30 to +70°C

34mm

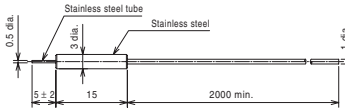
Cut to length

CAD file No. HP-0030

Head detail



Nut and washer: B type



HPF-T017

R35

-60 to +105°C

1,200mm

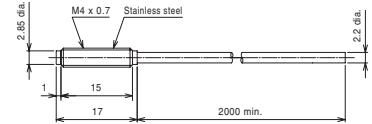
Cut to length

CAD file No. HP-2035

Head detail



Nut and washer: B type



HPF-T018

R15

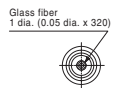
-40 to +200°C

620mm

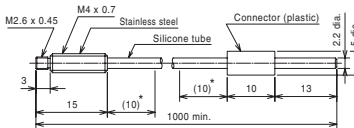
Cut to length

CAD file No. HP-2036

Head detail



Nut and washer: B type



HPF-T019

R20

-30 to +70°C

4,110mm

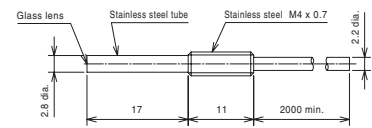
Cut to length

CAD file No. HP-2026

Head detail



Nut and washer: B type



HPF-T020

R20

-30 to +70°C

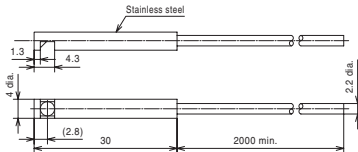
4,540mm

Cut to length

CAD file No. HP-2029



Nut and washer: B type



HPF-T021

R4

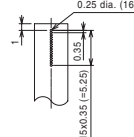
-30 to +70°C

790mm

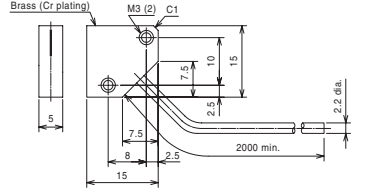
Cut to length

CAD file No. HP-2037

Head detail



Nut and washer: B type



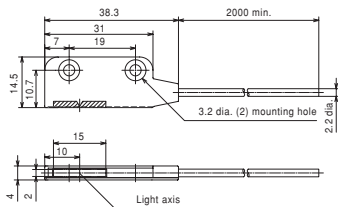
HPF-T021T

R15

-30 to +70°C

3,600mm

Cut to length



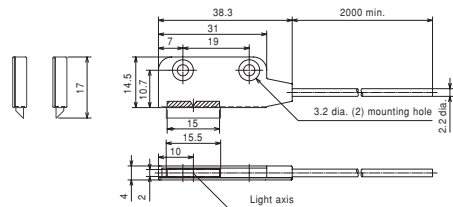
HPF-T021S

R15

-30 to +70°C

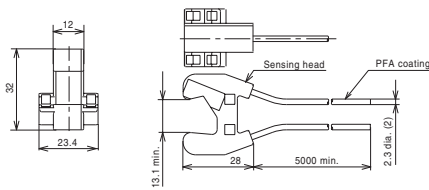
3,450mm

Cut to length



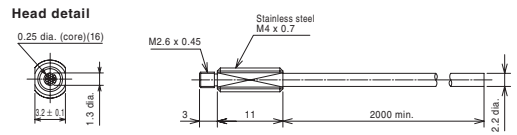
HPF-T032

R4 -30 to +70°C Cut to length CAD file No. EC10225



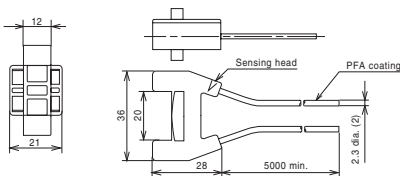
HPF-T033

R4 -30 to +70°C 940mm Cut to length CAD file No. EC10227



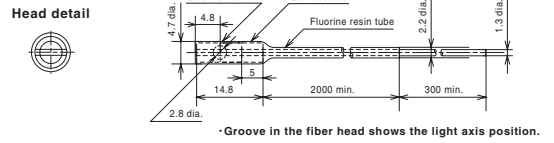
HPF-T034

R4 -30 to +70°C Cut to length CAD file No. EC10307



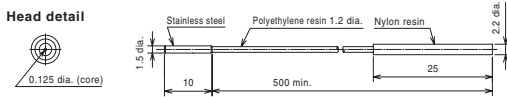
HPF-T035

R.20 -30 to +70°C 1,030mm Cut to length CAD file No. EC10334



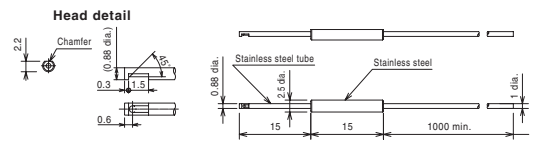
HPF-T036

R.15 -30 to +70°C 17mm Cut to length CAD file No. EC10335



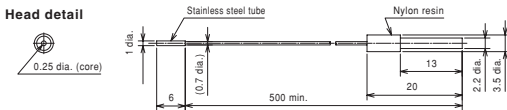
HPF-T037

R.5 -30 to +60°C 55mm Cut to length CAD file No. EC10336



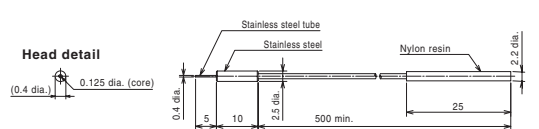
HPF-T038

R.15 -30 to +70°C 34mm Cut to length CAD file No. EC10338



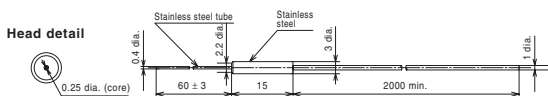
HPF-T039

R.15 -30 to +70°C 17mm Cut to length CAD file No. EC10339



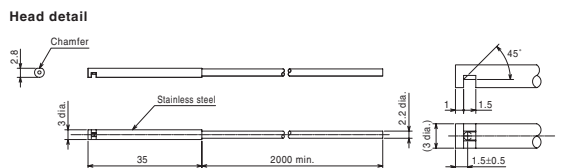
HPF-T040

R.15 -30 to +70°C 35mm Cut to length



HPF-T042

R.20 -30 to +70°C 660mm Cut to length CAD file No. EC10360



HPF-T043

R 1.5

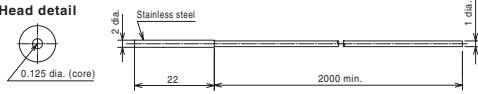
-30 to +70 °C

300mm

Cut to length

CAD file No. EC10355

Head detail



HPF-T044

R 1.5

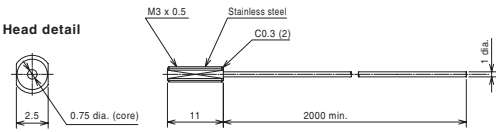
-30 to +70 °C

675mm

Cut to length

CAD file No. EC10361

Head detail



HPF-T045

R 2.0

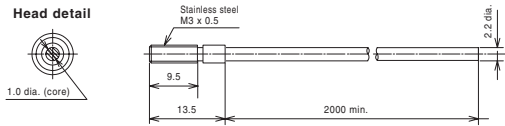
-30 to +70 °C

1,200mm

Cut to length

CAD file No. EC10356

Head detail



HPF-T046

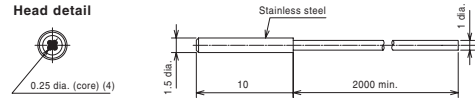
R 4

-30 to +70 °C

180mm

Cut to length

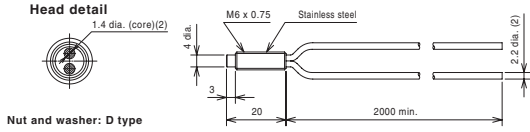
Head detail



Diffuse scan (unit: mm)

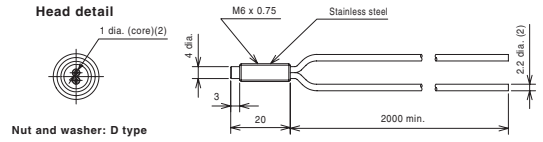
HPF-D001

R20 -30 to +70°C 580mm Cut to length CAD file No. HP-2001



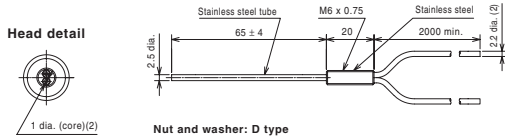
HPF-D002

R20 -30 to +70°C 430mm Cut to length CAD file No. HP-2002



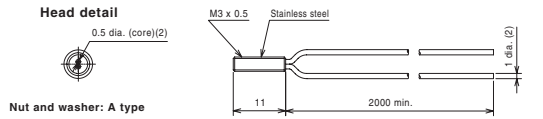
HPF-D003

R20 -30 to +70°C 430mm Cut to length CAD file No. HP-2003



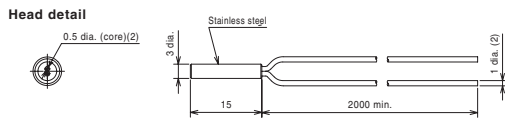
HPF-D004

R15 -30 to +70°C 110mm Cut to length CAD file No. HP-2004



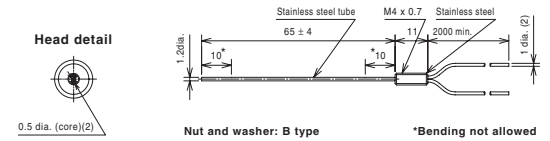
HPF-D005

R15 -30 to +70°C 110mm Cut to length CAD file No. HP-2005



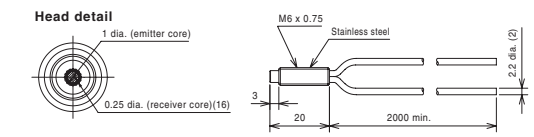
HPF-D006

R15 -30 to +70°C 110mm Cut to length CAD file No. HP-2006



HPF-D009

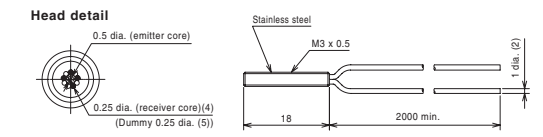
R20 -30 to +70°C 430mm Cut to length CAD file No. HP-2007



Nut and washer: D type
Note: Emitter fiber is marked with a white line.

HPF-D010

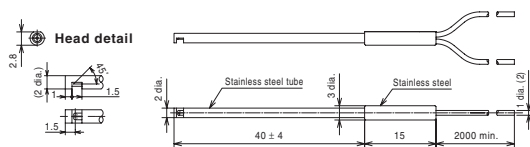
R15 -30 to +70°C 95mm Cut to length CAD file No. HP-2008



Note: Emitter fiber is marked with a white line.

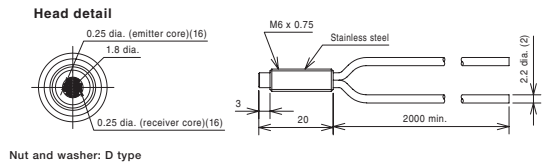
HPF-D011

R15 -30 to +70°C 45mm Cut to length CAD file No. HP-2009



HPF-D012

R4 -30 to +70°C 265mm Cut to length CAD file No. HP-2010



HPF-D013

R2.5

-30 to +105°C

190mm

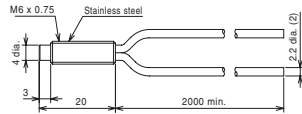
Cut to length

CAD file No. HP-2002

Head detail



Nut and washer: D type



HPF-D014

R80

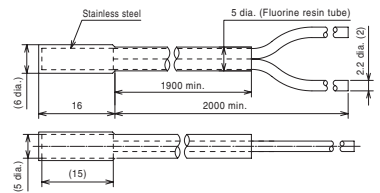
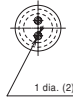
-30 to +70°C

190mm

Cut to length

CAD file No. HP-2011

Head detail



HPF-D015

R2.5

-60 to +350°C

160mm

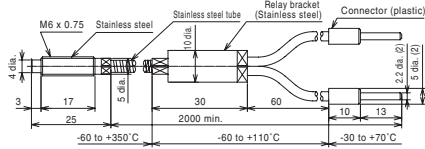
Cut to length

CAD file No. HP-2012

Head detail



Nut and washer: D type



HPF-D018

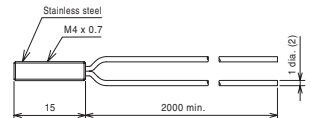
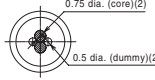
R15

-30 to +70°C

215mm

Cut to length

Head detail



HPF-D019

R15

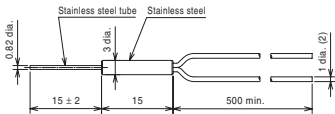
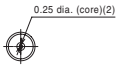
-30 to +70°C

11mm

Cut to length

CAD file No. EC10040

Head detail



HPF-D021

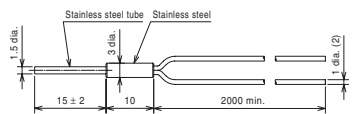
R15

-30 to +70°C

95mm

Cut to length

Head detail



HPF-D022

R3.5

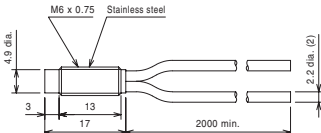
-60 to +150°C

430mm

Cut to length

CAD file No. HP-2031

Head detail



HPF-D023

R15

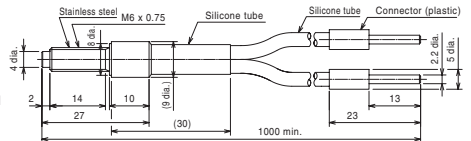
-40 to +200°C

190mm

Cut to length

CAD file No. HP-2032

Head detail



Nut and washer: E type

HPF-D024

R15

-40 to +200°C

190mm

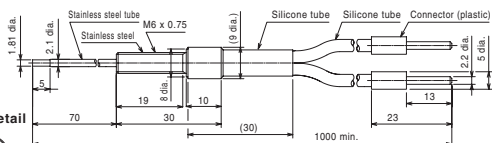
Cut to length

CAD file No. HP-2033

Head detail



Nut and washer: E type



HPF-D025

R15

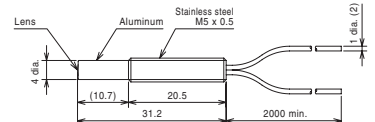
-30 to +70°C

20mm

Cut to length

CAD file No. HP-2026

Head detail



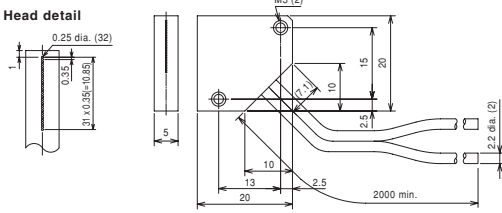
Nut and washer: C type

Note: Emitter fiber is marked with a white line.

HPF-D026

R4 -30 to +70°C 290mm Cut to length CAD file No. HP-0034

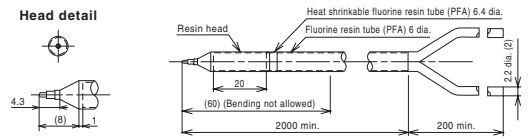
Head detail



HPF-D027

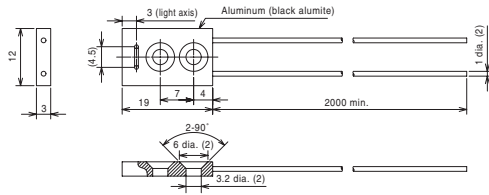
Fiber Tube R25/R40 -30 to +150°C Cut to length CAD file No. HP-0038

Head detail



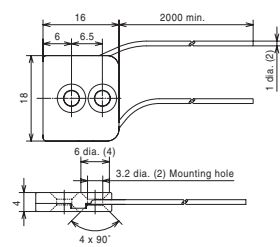
HPF-D028

R15 -30 to +70°C 2.5±0.5mm Cut to length CAD file No. HP-0023



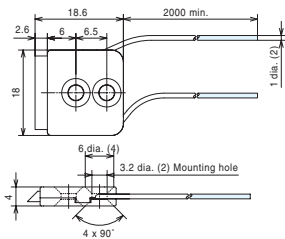
HPF-D028T

R15 -30 to +70°C 7.4±1.8mm Cut to length



HPF-D028F

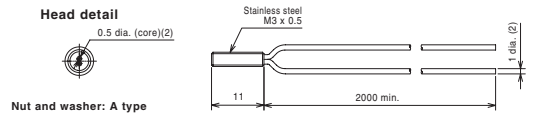
R15 -30 to +70°C 5.2±2.0mm Cut to length



HPF-D029

R1 -30 to +70°C 25mm Cut to length CAD file No. HP-0028

Head detail

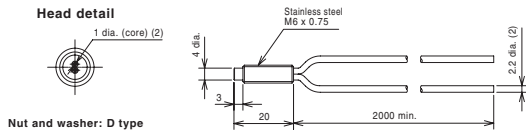


Nut and washer: A type

HPF-D030

R2 -30 to +70°C 230mm Cut to length CAD file No. HP-0027

Head detail

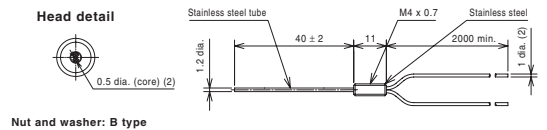


Nut and washer: D type

HPF-D031

Tube Fiber R10/R1 -30 to +70°C 25mm Cut to length CAD file No. HP-0036

Head detail

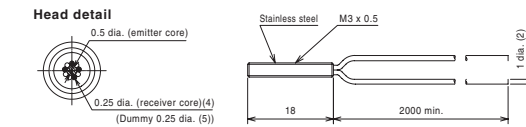


Nut and washer: B type

HPF-D032

Emitter Receiver R1/R4 -30 to +70°C 50mm Cut to length CAD file No. HP-0035

Head detail



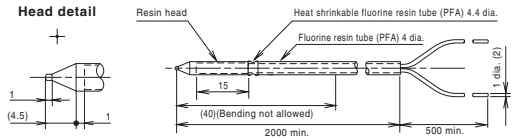
Nut and washer: A type

Note: Emitter fiber is marked with a white line.

HPF-D033

Fiber Tube R15/R30 -30 to +105°C Cut to length CAD file No. EC10033

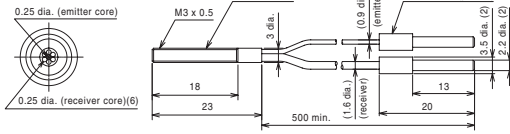
Head detail



HPF-D034

R4 -30 to +70°C 70mm CAD file No. EC10034

Head detail



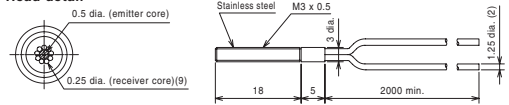
Nut and washer: A type

Note: Emitter fiber is the thinner one (0.9mm dia.).

HPF-D035

R15 -30 to +70°C 95mm Cut to length CAD file No. EC10082

Head detail



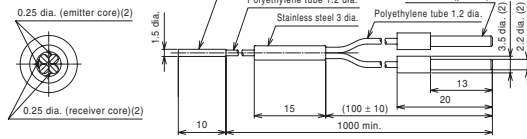
Nut and washer: A type

Note: Emitter fiber is marked with a white line.

HPF-D036

R4 -30 to +70°C 17mm CAD file No. EC10188

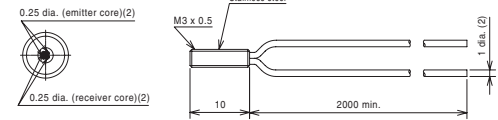
Head detail



HPF-D037

R4 -30 to +70°C 21mm Cut to length CAD file No. EC10189

Head detail

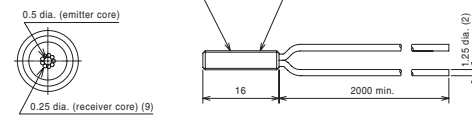


Nut and washer: A type

HPF-D038

R15 -30 to +70°C 95mm Cut to length CAD file No. EC10198

Head detail



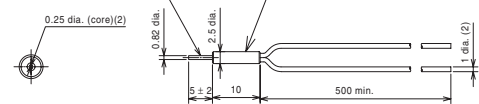
Nut and washer: B type

Note: Emitter fiber is marked with a white line.

HPF-D039

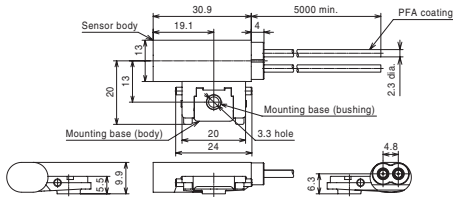
R4 -30 to +70°C 11mm Cut to length CAD file No. EC10191

Head detail



HPF-D040

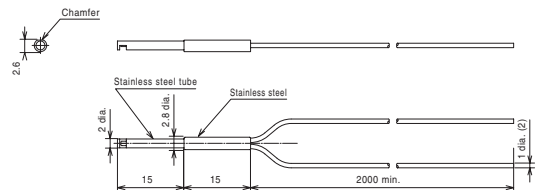
R20 -30 to +70°C Cut to length CAD file No. EC10238



HPF-D041

R15 -30 to +70°C 45mm Cut to length CAD file No. EC10357

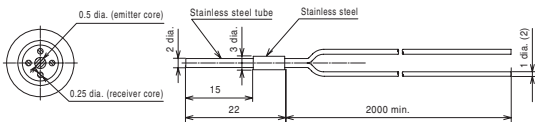
Head detail



HPF-D042

R15 -30 to +70°C 100mm Cut to length CAD file No. EC10358

Head detail

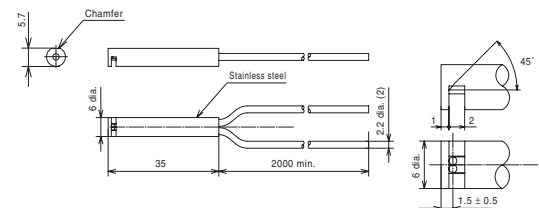


Note: Emitter fiber is marked with a white line.

HPF-D043

R20 -30 to +70°C 180mm Cut to length CAD file No. EC10362

Head detail



HPF-D044

R5

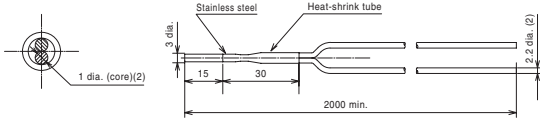
-30 to +70°C

240mm

Cut to length

CAD file No. EC10273

Head detail



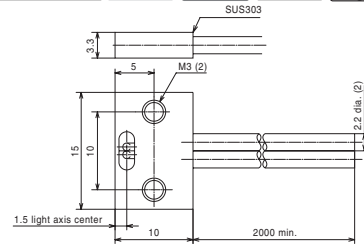
HPF-D045LF

R2

-30 to +70°C

105mm

Cut to length



Vacuum models (unit: mm)

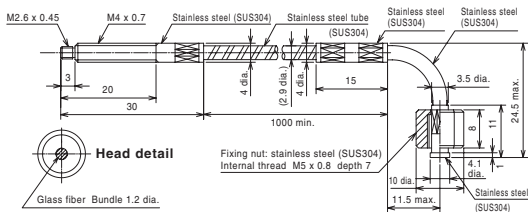
HPF-VT07

R.25

-40 to +350°C

360mm

CAD file No. EC10273



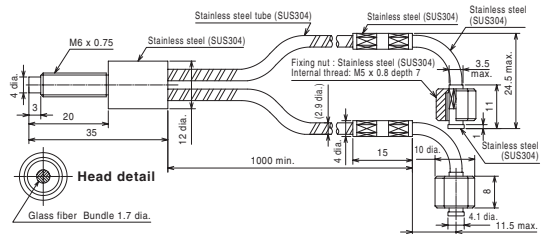
HPF-VD07

R.25

-40 to +350°C

35mm

CAD file No. EC10196



HPF-VD09

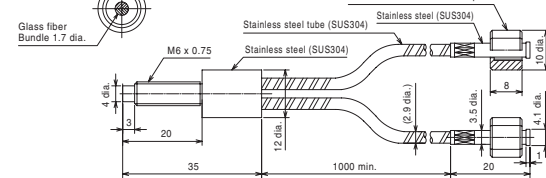
R.25

-40 to +350°C

35mm

CAD file No. EC10304

Head detail



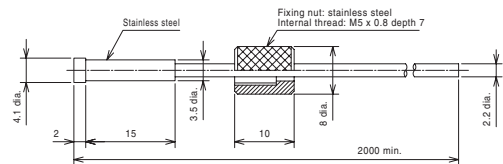
HPF-VA01

R20

-30 to +70°C

Cut to length

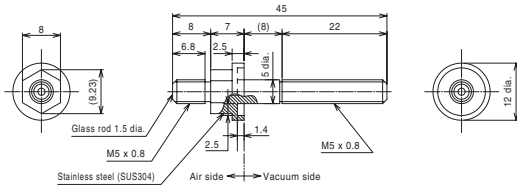
CAD file No. EC10041



HPF-VJ03

-40 to +200°C

CAD file No. EC10274



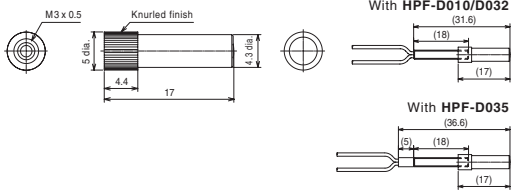
Allowable mounting plate thickness: 8 to 10 mm

EXTERNAL DIMENSIONS OF ATTACHMENT

Allowable bend radius
Ambient operating temperature

HPF-LU01

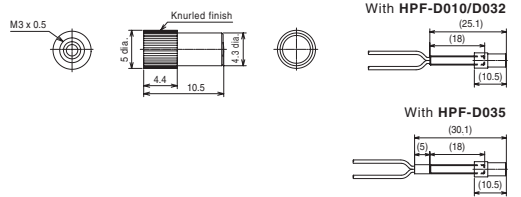
-30 to +70°C



HPF-LU02

-30 to +70°C

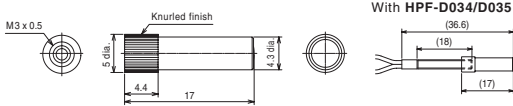
CAD file No. HP-2030



HPF-LU07

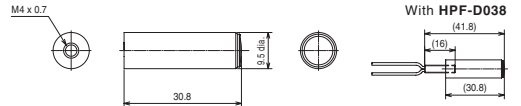
-30 to +70°C

CAD file No. EC10035



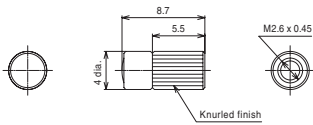
HPF-LU08

-30 to +70°C



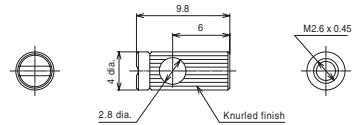
FE-PA-L1

-40 to +200°C



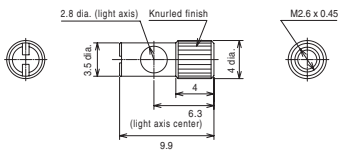
FE-PA-S1

-40 to +200°C



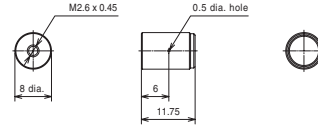
HPF-VL05

-40 to +350°C

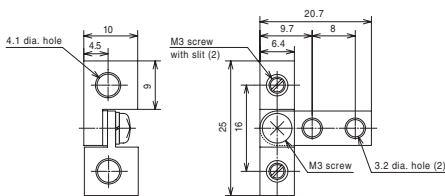


HPF-VL06

-40 to +350°C



HPX-PA06

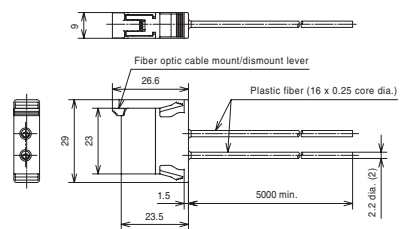


HPF-EU05

R4

-25 to +60°C

Cut to length



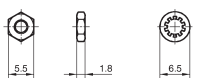
Allowable mounting plate thickness: 1.0 to 2.0 mm

Hexagonal nut and toothed lock washer

Nut types (A, B, C, D and E) do not have a part number, but are accessories of the fiber optic units. There is no catalog listing.

(unit: mm)

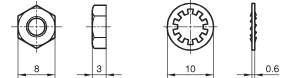
Type A M3 x 0.5



Type B M4 x 0.7



Type C M5 x 0.5



Type D M6 x 0.75

