

01

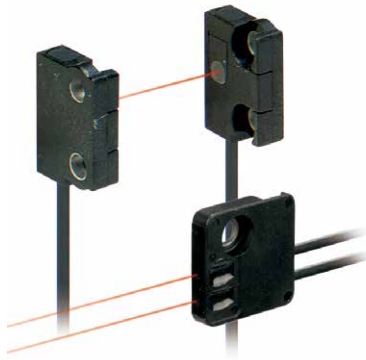
Easy mounting

Related
products

Fiber amplifier

D3RF
P.110

Fiber amplifier

BRF
P.130

Square type with mounting hole that can be installed easily

- | An adjustable mounting type that switches between Head ON/Side ON switchable type is also available
- | Head ON, Side ON and Flat ON types are available.
- | Bending radius of R1 mm or R4 mm

Head ON/Side ON switchable type Switchable direction

Because the direction of the cable from the sensor head can be switchable, you can switch from Head ON to Side ON easily. It will help reducing inventory of the fiber cable. The bending radius is R1 mm which helps flexibility of installing the fiber cable.

For Side ON

For Head ON



Through-beam type: NF-TE02, NF-TE04 Diffuse type: NF-DE02, NF-DE04

Line up of Head ON, Side ON and Flat ON types

Compact and long-distance detecting Head ON, Side ON, and Flat ON types are available. Selection from among these easy-to-mount types.

Head ON Type

Through-beam type: NF-TR11, NF-TR06



Side ON Type

Through-beam type:
NF-TR12, NF-TR05

Flat ON Type

Through-beam type:
NF-TE01, NF-TE03
NF-TE05, NF-TR13
Diffuse type:
NF-DE01, NF-DE03

*Image shows NF-TE05.



Line up of R1 mm and R4 mm type

Available fiber cables include an easy-to-handle flexible R1 mm and a flexible R4 mm optimal for mounting to moving parts. Selectable based on the application.

Photoelectric
SensorsPhotoelectric
SensorsSpecialized
Photoelectric
SensorsLaser
Displacement
Sensors

Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

Retro-reflective

Small object
detection

Screen/Array

Limited diffuse

Narrow view/
wafer mapping

Heat resistant

Chemical
resistantVacuum
resistantLiquid level/liquid leakage/
water detectionLens for
through-beam type

Correct use

Easy mounting fiber units (through-beam type)

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SensorsPhotoelectric
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water detectionLens for
through-beam type

Correct use

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Through-beam type	Flexible, Head ON, Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,580 4-LG 3,060 3-ST 1,980 2-FS 1,350 1-HS 530	Long 2,700 Std 1,600 Fast 850	1,600	-40 to +60°C	R1	NF-TR11
	Flexible, Side ON, Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,150 3-ST 2,000 2-FS 1,200 1-HS 540	Long 2,700 Std 1,500 Fast 1,000	1,300	-40 to +60°C	R1	NF-TR12
	Flexible, Flat ON, Free cut 	7-EL 1,190 6-UL 1,120 5-PL 980 4-LG 850 3-ST 550 2-FS 310 1-HS 100	Long 600 Std 350 Fast 200	220	-40 to +60°C	R1	NF-TE01
	Flexible, Flat ON, Free cut 	7-EL 1,890 6-UL 1,770 5-PL 1,540 4-LG 1,350 3-ST 880 2-FS 520 1-HS 170	Long 900 Std 500 Fast 350	450	-40 to +60°C	R1	NF-TE03
	Flexible, Flat ON, Free cut 	7-EL 2,450 6-UL 2,300 5-PL 2,010 4-LG 1,710 3-ST 1,150 2-FS 650 1-HS 220	Long 1,200 Std 650 Fast 330	500	-40 to +60°C	R1	NF-TR13
	*Those for emitting and receiving are symmetrical in shape.						

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Easy mounting fiber units (through-beam type)

Photoelectric Sensors

Photoelectric Sensors

Specialized
Photoelectric
Sensors

Laser Displacement Sensors

Fiber Units

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Flexible R4/R2

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Heat resistant

Chemical

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water detection

Lens for
through-beam type

Correct use

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Through-beam type	Flexible, Head ON/Side ON switchable type, Free cut <p>0.5 2 10 1000 1.05 3.5 2.5 ø2 hole, ø3.6 countersinking depth 1.4 5 10 Inner pipe (SUS) ø1.5 Light axis Housing (Polycarbonate) Multi core fiber (Core: acrylic, sheath: polyethylene) Detecting part detail Light axis 7 2.3 1 0.6 ø0.5 Multi core fiber ø0.0375 x 151</p>	7-EL 430 6-UL 400 5-PL 350 4-LG 300 3-ST 190 2-FS 120 1-HS 36	Long 250 Std 120 Fast 55	110	-40 to +60°C	R1	NF-TE02 Switchable direction
	Flexible, Head ON/Side ON switchable type, Free cut <p>1 11 2000 1.05 3.5 3.5 ø3.2 hole, ø5.6 countersinking depth 2.2 7 14 Inner pipe (SUS) ø2.4 Light axis Housing (Polycarbonate) Multi core fiber (Core: acrylic, sheath: polyethylene) Detecting part detail Light axis 7 2.9 1.6 0.9 ø1 Multi core fiber ø0.075 x 151</p>	7-EL 1,340 6-UL 1,260 5-PL 1,090 4-LG 960 3-ST 630 2-FS 390 1-HS 130	Long 750 Std 450 Fast 250	280	-40 to +60°C	R1	NF-TE04 Switchable direction
	Flexible, Head ON, Free cut <p>Detecting part detail 3 11 2000 2.5 3.5 ø1.25 8 Light axis Housing (Polycarbonate) Multi core fiber (Core: acrylic, sheath: polyethylene) Light axis 2 1.75 7.5 2-ø2.2</p>	7-EL 3,600 6-UL 3,600 5-PL 3,580 4-LG 3,060 3-ST 1,980 2-FS 1,400 1-HS 500	Long 2,700 Std 1,600 Fast 850	1,100	-40 to +60°C	R4	NF-TR06
	Flexible, Side ON, Free cut <p>Detecting part detail 3 11 2000 2.5 3.5 ø1.25 8 Light axis Housing (Polycarbonate) Multi core fiber (Core: acrylic, sheath: polyethylene) Light axis 2 1.75 7.5 2-ø2.2</p>	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,150 3-ST 2,000 2-FS 1,100 1-HS 320	Long 2,700 Std 1,300 Fast 600	1,100	-40 to +60°C	R4	NF-TR05
	Flexible, Flat ON, Free cut <p>Detecting part detail 3 11 2000 2.2 3.5 ø1.25 8.5 Light axis Housing (Polycarbonate) Multi core fiber (Core: acrylic, sheath: polyethylene) Light axis 2 1.75 7.5 2-ø2.2</p>	7-EL 1,600 6-UL 1,510 5-PL 1,320 4-LG 1,150 3-ST 750 2-FS 410 1-HS 130	Long 750 Std 450 Fast 280	300	-40 to +60°C	R4	NF-TE05
		*Those for emitting and receiving are symmetrical in shape.					

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Easy mounting fiber units (diffuse type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Diffuse type	Flexible, Flat ON, Free cut 	7-EL 140 6-UL 135 5-PL 110 4-LG 99 3-ST 70 2-FS 34 1-HS 10	Long 60 Std 30 Fast 10 to 16	30	-40 to +60°C	R1	NF-DE01
	Flexible, Flat ON, Free cut 	7-EL 490 6-UL 450 5-PL 400 4-LG 350 3-ST 225 2-FS 117 1-HS 41	Long 250 Std 100 Fast 60	100	-40 to +60°C	R1	NF-DE03
	Flexible, Head ON/Side ON switchable type, Free cut 	7-EL 160 6-UL 150 5-PL 130 4-LG 117 3-ST 77 2-FS 43 1-HS 12	Long 65 Std 35 Fast 20	30	-40 to +60°C	R1	NF-DE02 Switchable direction
	Flexible, Head ON/Side ON switchable type, Free cut 	7-EL 480 6-UL 450 5-PL 390 4-LG 340 3-ST 225 2-FS 117 1-HS 45	Long 250 Std 120 Fast 80	100	-40 to +60°C	R1	NF-DE04 Switchable direction

●The sensing distances for the diffuse type fiber units are values on 500 × 500 mm white paper.

●Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

02

Thread type

Related
products

Fiber amplifier

D3RF
P.110



Fiber amplifier

BRF
P.130



Type that can be mounted with a threaded nut Fiber units

- Adjustable mounting type that switches between straight view and side view also available
- A metal sheath type that protects against cable breakage, as well as lens attachable models are available.

New concept Straight view/side view switchable type Switchable direction

The **NF-TR14** can be used as a side view type by bending the fiber cable to fit the slit in the side of the nut. This fiber unit is a completely new concept that allows switching between side view and straight view according to mounting conditions.



Metal sheath type Breakage prevention

Stainless steel mesh structure sheath protects the fiber cable and prevents fiber cable breakage due to snagging. The bending radius R10 mm allows the cable to bend in tight areas without breaking.



Through-beam type: **NF-TJ01** Diffuse type: **NF-DJ01, NF-DJ02**

Photoelectric
Sensors

Photoelectric
Sensors

Specialized
Photoelectric
Sensors

Laser
Displacement
Sensors

Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

Retro-reflective

Small object
detection

Screen/Array

Limited diffuse

Narrow view/
wafer mapping

Heat resistant

Chemical
resistant

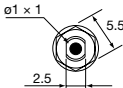
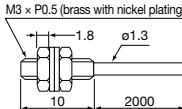
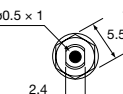
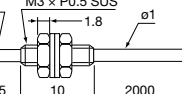
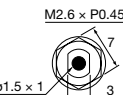
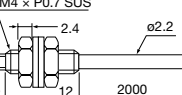
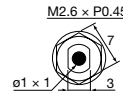
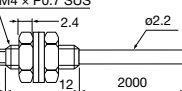
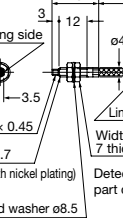
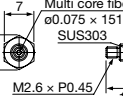
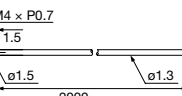
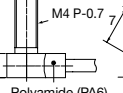
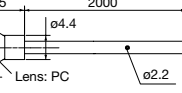
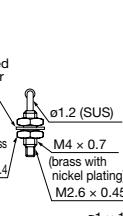
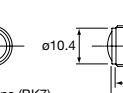
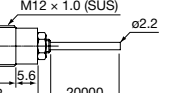
Vacuum
resistant

Liquid level/liquid leakage/
water detection

Lens for
through-beam type

Correct use

Thread type fiber units (through-beam type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model		
		D3RF	D2RF	BRF					
M3	Free cut 	M3 x P0.5 (brass with nickel plating) 	7-EL 3,500 6-UL 2,100 5-PL 1,600 4-LG 1,400	3-ST 1,000 2-FS 550 1-HS 175	Long 1,000 Std 500 Fast 250	450	-40 to +70°C	R25	NF-TM01
	Free cut 	M3 x P0.5 SUS 	7-EL 900 6-UL 550 5-PL 400 4-LG 350	3-ST 250 2-FS 140 1-HS 45	Long 350 Std 200 Fast 90	120	-40 to +70°C	R15	NF-TM02
M4	Lens attachable (P.98), Free cut 	M2.6 x P0.45 SUS M4 x P0.7 SUS 	7-EL 4,000 6-UL 3,000 5-PL 2,200 4-LG 1,900	3-ST 1,400 2-FS 750 1-HS 250	Long 1,800 Std 800 Fast 450	700	-40 to +70°C	R30	NF-TB01 Low cost
	Lens attachable (P.98), Free cut 	M2.6 x P0.45 SUS M4 x P0.7 SUS 	7-EL 4,000 6-UL 2,000 5-PL 1,600 4-LG 1,400	3-ST 1,000 2-FS 550 1-HS 175	Long 1,000 Std 500 Fast 250	450	-40 to +70°C	R25	NF-TB02
	Metal sheath, Lens attachable (P.98) 	M2.6 x 0.45 M4 x 0.7 (brass with nickel plating) Liner + blade tube (SUS) Width across flats 7 thickness 2.4 Plastic plug (PA) Mounting bracket (brass with nickel plating) Detecting part detail Toothed washer ø8.5 ø0.265 x 16	7-EL 1,590 6-UL 1,440 5-PL 1,260 4-LG 1,140 3-ST 740 2-FS 410 1-HS 130	Long 350 Std 220 Fast 110	300	-40 to +60°C	R10	NF-TJ01 Breakage prevention	
	Nut type, Straight view/side view switchable type, Flexible, Free cut 	Multi core fiber ø0.075 x 151 SUS303 M4 x P0.7 	7-EL 3,800 6-UL 2,700 5-PL 2,200 4-LG 1,800	3-ST 1,200 2-FS 800 1-HS 300	Long 1,300 Std 600 Fast 300	400	-40 to +60°C	R2	NF-TR14 Switchable direction
	Nut type, Free cut 	M4 P-0.7 	7-EL 2,500 6-UL 1,400 5-PL 1,300 4-LG 1,000	3-ST 750 2-FS 350 1-HS 100	Long 800 Std 600 Fast 200	350	-40 to +70°C	R25	NF25-T Space-saving
	Elbow type, Lens attachable (P.98), Free cut 	Toothed washer ø8.5 ø1.2 (SUS) Width across flats 7 thickness 2.4 M4 x 0.7 (brass with nickel plating) M2.6 x 0.45 ø1 x 1 Screwing side Screwing side	7-EL 1,440 6-UL 1,350 5-PL 1,170 4-LG 1,060 3-ST 690 2-FS 430 1-HS 130	Long 750 Std 450 Fast 200	350	-40 to +70°C	R25	NF-TB06	
M12	Super long distance with large lens, Fiber length 20 m, Free cut 	M12 x 1.0 (SUS) 	7-EL 38,000 6-UL 25,000 5-PL 20,000 4-LG 18,000	3-ST 12,000 2-FS 7,000 1-HS 1,800	Long 12,000 Std 6,500 Fast 3,500	2,800	-40 to +70°C	R30	NF-TX01

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

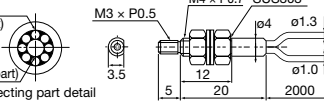
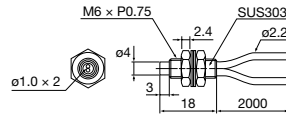
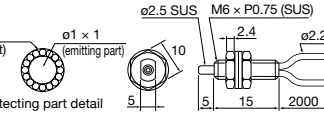
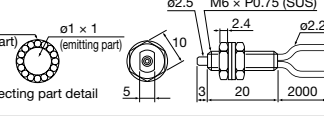
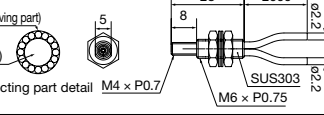
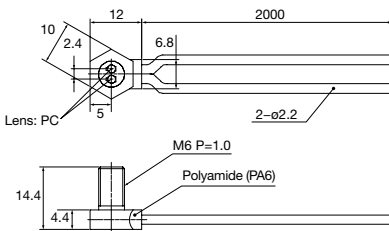
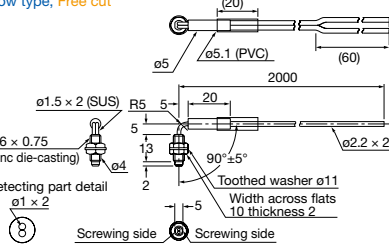
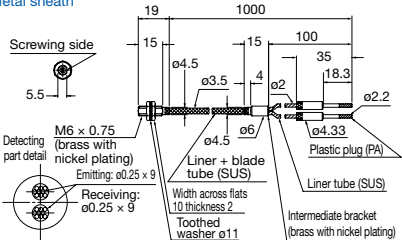
Thread type fiber units (through-beam type/diffuse type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model	
		D3RF	D2RF	BRF				
M3	Free cut 	7-EL 300 6-UL 160 5-PL 150 4-LG 120	3-ST 80 Long 100 2-FS Std 50 Fast 1-HS 10 25		35	-40 to +70°C	R15	FD-TT2 Low cost
	Standard, Free cut 	7-EL 400 6-UL 200 5-PL 190 4-LG 160	3-ST 100 2-FS 50 1-HS 10 30	Long 100 Std 60 Fast 30	45	-40 to +70°C	R15	NF-DS06
	Coaxial, Lens attachable (P64), Free cut 	7-EL 500 6-UL 300 5-PL 250 4-LG 225	3-ST 150 2-FS 100 1-HS 30 50	Long 250 Std 120 Fast 50	70	-40 to +70°C	R15	NF-DT01
	Coaxial, Free cut 	7-EL 310 6-UL 290 5-PL 260 4-LG 220 3-ST 140 2-FS 70 1-HS 20	Long 170 Std 80 Fast 45		55	-40 to +60°C	R25	NF-DB07
	Coaxial, Lens attachable (P64) 	7-EL 180 6-UL 110 5-PL 100 4-LG 85	3-ST 60 2-FS 40 1-HS 12 15	Long 70 Std 40 Fast 15	20	-40 to +70°C	R15	NF-DK21
	Coaxial, Metal sheath 	7-EL 180 6-UL 170 5-PL 150 4-LG 130 3-ST 80 2-FS 40 1-HS 10	Long 120 Std 50 Fast 30		50	-40 to +60°C	R10	NF-DJ01 Breakage prevention
M4	Standard, Free cut 	7-EL 1,100 6-UL 650 5-PL 550 4-LG 450	3-ST 350 2-FS 200 1-HS 60 100	Long 400 Std 250 Fast 100	160	-40 to +70°C	R25	NF-DM01
	Coaxial, Lens attachable (P64), Free cut 	7-EL 500 6-UL 300 5-PL 250 4-LG 225	3-ST 150 2-FS 100 1-HS 30 50	Long 250 Std 120 Fast 50	70	-40 to +70°C	R15	NF-DM02

●The sensing distances for the diffuse type fiber units are values on 500 x 500 mm white paper.

- Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Thread type fiber units (diffuse type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model	
		D3RF	D2RF	BRF				
M4	Coaxial, Lens attachable (P64), Free cut 	7-EL 680 6-UL 370 5-PL 270 4-LG 230	3-ST 150 2-FS 90 1-HS 20	Long 140 Std 70 Fast 30	70	-40 to +70°C	R15	NF-DM02-G4
	Standard, Free cut 	7-EL 1,200 6-UL 750 5-PL 650 4-LG 550	3-ST 400 2-FS 250 1-HS 80	Long 400 Std 250 Fast 100	160	-40 to +70°C	R25	NF-DK06
	Coaxial, Free cut 	7-EL 1,200 6-UL 750 5-PL 650 4-LG 550	3-ST 400 2-FS 250 1-HS 75	Long 450 Std 250 Fast 100	150	-40 to +70°C	R25	NF-DB01 Low cost
	Coaxial, Free cut 	7-EL 1,200 6-UL 750 5-PL 650 4-LG 575	3-ST 400 2-FS 250 1-HS 75	Long 450 Std 250 Fast 100	150	-40 to +70°C	R25	NF-DB03
	Coaxial, Free cut 	7-EL 1,200 6-UL 650 5-PL 550 4-LG 500	3-ST 300 2-FS 150 1-HS 50	Long 450 Std 250 Fast 100	80	-40 to +70°C	R25	NF-DB04
M6	Nut type, Free cut 	7-EL 550 6-UL 330 5-PL 240 4-LG 200 3-ST 150 2-FS 90 1-HS 23	Long 120 Std 80 Fast 25	45	-40 to +70°C	R25	NF25-D Space-saving	
	Elbow type, Free cut 	7-EL 540 6-UL 510 5-PL 450 4-LG 390 3-ST 250 2-FS 140 1-HS 40	Long 300 Std 150 Fast 60	100	-40 to +70°C	R25	NF-DB09	
	Metal sheath 	7-EL 440 6-UL 410 5-PL 360 4-LG 310 3-ST 200 2-FS 100 1-HS 30	Long 280 Std 150 Fast 70	100	-40 to +70°C	R10	NF-DJ02 Breakage prevention	

●The sensing distances for the diffuse type fiber units are values on 500 × 500 mm white paper (1000 × 1000 mm white paper for NF25-D).

- Install use with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

03

Cylindrical type

Related
products

Fiber amplifier

D3RF

P.110



Fiber amplifier

BRF

P.130



Set screw mounted compact fiber unit



| Compact and space-saving.

| Selection is possible from among three types including fine core, side view and standard.

Choose from following three types according to the application

Super narrow type

Fine core

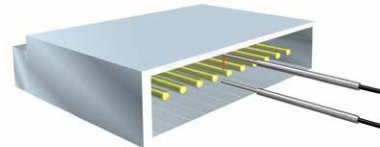
Through-beam type: NF-TR04, NF-TM03
NF-TR03, NF-TP01
Diffuse type: NF-DP01, NF-DR05Fiber unit with a core diameter of $\phi 0.25$ to 0.5 mm. Recommended for small object detection or high accuracy positioning purposes.

Side view type

Through-beam type:
NF-TG05, NF-TS08
NF-TV08, NF-TS22V
Diffuse type: NF-DR12

Can be installed in narrow spaces. Sleeve type is also available.

Connector pin detection



Standard type



Standard straight view type.

Photoelectric
SensorsPhotoelectric
SensorsSpecialized
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Displacement
Sensors

Fiber Units

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Flexible R1/R2

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detection

Screen/Array

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Heat resistant

Chemical
resistantVacuum
resistantLiquid level/liquid leakage/
water detectionLens for
through-beam type

Correct use

Cylindrical fiber units (through-beam type)

Photoelectric
SensorsPhotoelectric
SensorsSpecialized
Photoelectric
SensorsLaser
Displacement
Sensors

Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

Retro-reflective

Small object
detection

Screen/Array

Limited diffuse

Narrow view/
wafer mapping

Heat resistant

Chemical
resistantVacuum
resistantLiquid level/liquid leakage/
water detectionLens for
through-beam type

Correct use

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Through-beam type	ø1 Fine core, Flexible 	7-EL 54 6-UL 50 5-PL 44 4-LG 38 3-ST 25 2-FS 15 1-HS 5	Long 30 Std 18 Fast 8	10	-40 to +60°C	R4	NF-TR04 Fine core
	ø1.5 Fine core, Flexible 	7-EL 900 6-UL 550 5-PL 400 4-LG 350	3-ST 250 2-FS 140 1-HS 45 Fast 90	120	-40 to +70°C	R15	NF-TM03 Fine core Low cost
	ø1.5 Fine core, Flexible, Free cut 	7-EL 850 6-UL 550 5-PL 450 4-LG 400	3-ST 275 2-FS 150 1-HS 50 Fast 90	110	-40 to +70°C	R4	NF-TR03 Fine core
	ø2.5 Free cut 	7-EL 1,710 6-UL 1,530 5-PL 1,350 4-LG 1,230 3-ST 800 2-FS 480 1-HS 160	Long 900 Std 550 Fast 250	350	-40 to +70°C	R25	NF-TB07 Low cost
	ø3 Lens installed, Flexible, Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,150 4-LG 2,790	3-ST 1,800 2-FS 1,000 1-HS 340 Fast 550	550	-40 to +60°C	R1	NF-TR10
	ø3 Flexible, Free cut 	7-EL 4,000 6-UL 2,000 5-PL 1,600 4-LG 1,400	3-ST 1,000 2-FS 550 1-HS 180 Fast 200	360	-40 to +70°C	R2	NF-TK05
	ø3 Free cut 	7-EL 4,000 6-UL 3,000 5-PL 2,400 4-LG 2,100	3-ST 1,500 2-FS 800 1-HS 220 Fast 450	700	-40 to +70°C	R30	NF-TS07
	ø0.25 fine sleeve: 5 mm long 	7-EL 27 6-UL 25 5-PL 21 4-LG 18 3-ST 12 2-FS 7 1-HS 2	Long 6 Std 3.5 Fast 2	1	-40 to +70°C	R5	NF-TP01 Fine core

●Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Cylindrical fiber units (through-beam type: side view type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Side view Through-beam type	ø1 sleeve: 15 mm long, Side view, Flexible, Free cut 	7-EL 160 6-UL 150 5-PL 130 4-LG 110 3-ST 76 2-FS 45 1-HS 11	Long 90 Std 50 Fast 25	20	-40 to +60°C	R1	NF-TG05
	Side view, Free cut 	7-EL 2,500 6-UL 1,900 5-PL 1,300 4-LG 1,100	3-ST 800 2-FS 400 1-HS 400 200	180	-40 to +70°C	R25	NF-TS08
	Side view, Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,240	3-ST 2,100 2-FS 1,600 1-HS 530	1,000	-40 to +60°C	R25	NF-TV08
	Side view, Flexible, Free cut 	7-EL 3,500 6-UL 3,500 5-PL 3,500 4-LG 3,000	3-ST 2,000 2-FS 1,000 1-HS 300	700	-40 to +70°C	R1	NF-TS22V

●Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

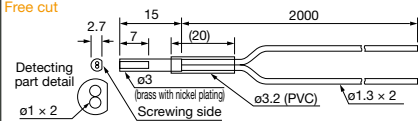
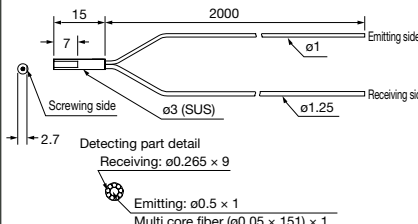
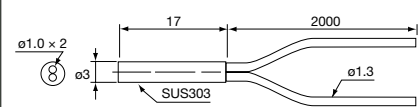
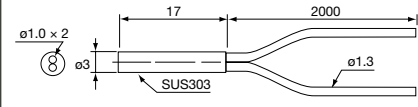
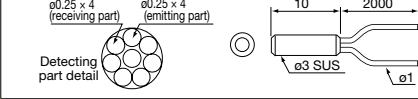
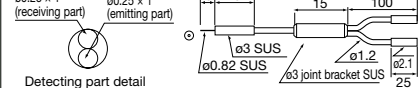
Cylindrical fiber units (diffuse type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Diffuse type	ø0.5 sleeve: 3 mm long, Fine 	7-EL 28 6-UL 26 5-PL 23 4-LG 20 3-ST 13 2-FS 3 1-HS 1	Long 18 Std 5 Fast Unusable	3	-40 to +60°C	R10	NF-DP01 Fine core
	Flexible 	7-EL 300 6-UL 180 5-PL 150 4-LG 130	3-ST 80 2-FS 45 1-HS 18	20	-40 to +70°C	R4	NF-DR04
	Free cut 	7-EL 400 6-UL 200 5-PL 190 4-LG 160	3-ST 100 2-FS 50 1-HS 10	45	-40 to +70°C	R15	NF-DT03

●The sensing distances for the diffuse type fiber units are values on 500 x 500 mm white paper.

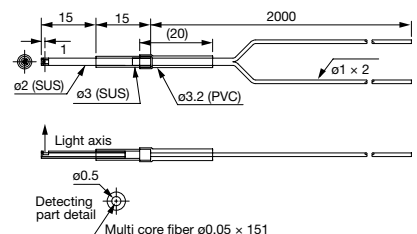
●Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Cylindrical fiber units (diffuse type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Diffuse type	Free cut 	7-EL 690 6-UL 640 5-PL 560 4-LG 490	3-ST 320 2-FS 190 1-HS 60	Long 400 Std 200 Fast 100	150	-40 to +70°C	R25 NF-DB10 Standard item
	Coaxial, Flexible, Free cut 	7-EL 270 6-UL 250 5-PL 210 4-LG 180 3-ST 120 2-FS 60 1-HS 20		Long 120 Std 70 Fast 35	55	-40 to +60°C	R2 NF-DR11
	Free cut 	7-EL 1,200 6-UL 750 5-PL 650 4-LG 550	3-ST 400 2-FS 200 1-HS 80	Long 400 Std 250 Fast 100	160	-40 to +70°C	R25 NF-DK04 Low cost
	Flexible, Free cut 	7-EL 850 6-UL 550 5-PL 450 4-LG 375	3-ST 275 2-FS 170 1-HS 55	Long 300 Std 180 Fast 80	110	-40 to +70°C	R2 NF-DK04Z
	Flexible, Free cut 	7-EL 450 6-UL 250 5-PL 190 4-LG 160	3-ST 120 2-FS 70 1-HS 25	Long 120 Std 50 Fast 25	35	-40 to +70°C	R4 NF-DR03
	ø0.82 sleeve: 5 mm long, Flexible 	7-EL 190 6-UL 125 5-PL 75 4-LG 65	3-ST 45 2-FS 25 1-HS 8	Long 40 Std 15 Fast 5	10	-40 to +70°C	R4 NF-DR05 Fine core

- The sensing distances for the diffuse type fiber units are values on 500 × 500 mm white paper.
- Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Cylindrical fiber units (diffuse type: side view type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Diffuse type	ø2 sleeve: 15 mm long, Flexible, Free cut 	7-EL 53 6-UL 50 5-PL 43 4-LG 36 3-ST 20 2-FS 12 1-HS 4	Long 25 Std 12 Fast 5	10	-40 to +60°C	R1	NF-DR12

- The sensing distances for the diffuse type fiber units are values on 500 × 500 mm white paper.
- Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

04

Sleeve type (straight view)

Related
products

Fiber units

Sleeve type
(Side view)
P.47

Fiber amplifier

D3RF
P.110

The fine tip makes mounting highly flexible and adjusting position very easy

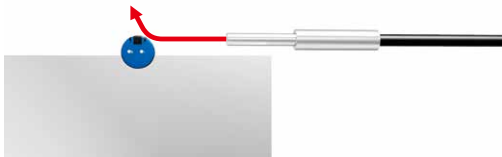
Long sleeve type can be bent

Thread type and cylindrical type available

Flexible mounting Bendable sleeve

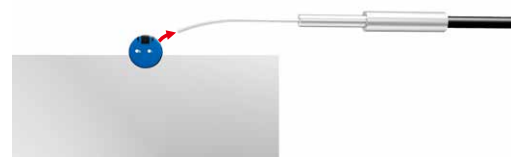
Long sleeve type can be bent (up to R10 mm). Fine tuning of the sensing position is possible even after the mounting position has been determined.

No sleeve



Difficult to change detection point after mounting

Bendable sleeve type



Fine tuning possible even after mounting

Bendable sleeve type

Through-beam type: NF-TB05, NF-TB03, NF-TH09

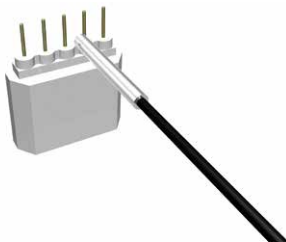
Diffuse type: NF-DB08, NF-DM03, NF-DR10, NF-DH05, NF-DB06, NF-DB02, NF-DH04

*Please bend the sleeve at an angle of 90° or less.

Easy position adjustment

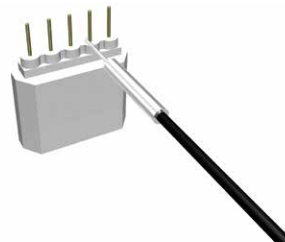
Position adjustment for the detection point can be easily performed when mounting due to the fact that the sleeve type has a fine tip and the workpiece is not hidden by the tip even when approaching the workpiece for detection.

No sleeve



Difficult to see small workpieces and difficult to adjust position.

Fine sleeve type



The tip does not get in the way, making position adjustment easy.

Fine sleeve type

Through-beam type:

NF-TB05, NF-TP01, NF-TT01

Diffuse type: NF-DB05, NF-DT04,

NF-DT02, NF-DP01, NF-DR05, NF-DR07

Photoelectric
SensorsPhotoelectric
SensorsSpecialized
Photoelectric
SensorsLaser
Displacement
Sensors

Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

Retro-reflective

Small object
detection

Screen/Array

Limited diffuse

Narrow view/
wafer mapping

Heat resistant

Chemical
resistantVacuum
resistantLiquid level/liquid leakage/
water detectionLens for
through-beam type

Correct use

Sleeve fiber units (through-beam type)

Photoelectric Sensors

Photoelectric Sensors

Specialized Photoelectric Sensors

Laser Displacement Sensors

Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

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Limited diffuse

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Chemical
resistant

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resistant

Liquid level/liquid leakage/
water detection

Lens for
through-beam type

Correct use

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model	
		D3RF	D2RF	BRF				
Through-beam type	M3 ø0.88 sleeve: 40 mm long, Free cut 	7-EL 470 6-UL 450 5-PL 380 4-LG 340 3-ST 220 2-FS 120 1-HS 45	Long 270 Std 140 Fast 80	100	-40 to +70°C	Fiber R25 Sleeve R10	NF-TB05 Bendable sleeve	
	M4 ø1.5 sleeve: 90 mm long, Free cut 	7-EL 4,000 6-UL 1,900 5-PL 1,900 4-LG 1,600	3-ST 1,200 2-FS 550 1-HS 180	Long 1,000 Std 600 Fast 250	450	-40 to +70°C	Fiber R25 Sleeve R15	NF-TB03 Bendable sleeve
	ø3 ø2.1 sleeve: 60 mm long, Heat resistant 	7-EL 1,350 6-UL 1,260 5-PL 1,120 4-LG 900 3-ST 630 2-FS 410 1-HS 120	Long 750 Std 450 Fast 220	300	-30 to +350°C or -60 to +200°C	Fiber R25 Sleeve R10	NF-TH09 Bendable sleeve	
	ø0.25 fine sleeve: 5 mm long 	7-EL 27 6-UL 25 5-PL 21 4-LG 18	3-ST 12 2-FS 7 1-HS 2	Long 6 Std 3.5 Fast 2	1	-40 to +70°C	R5	NF-TP01 Fine core
	ø0.5 fine sleeve: 5 mm long, Free cut 	7-EL 170 6-UL 110 5-PL 80 4-LG 70	3-ST 50 2-FS 25 1-HS 8	Long 80 Std 40 Fast 20	30	-40 to +70°C	R15	NF-TT01 Low cost

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Sleeve fiber units (diffuse type)

Type		Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
			D3RF	D2RF	BRF			
Diffuse type	M3	<p>ø0.8 sleeve: 15 mm long, Coaxial</p> <p>Receiving: ø0.125 x 9</p> <p>2.7</p> <p>15</p> <p>10</p> <p>20</p> <p>69.5</p> <p>30.5</p> <p>19</p> <p>ø0.8 (SUS)</p> <p>M3 x 0.5</p> <p>(Brass with nickel plating)</p> <p>Screwing side</p> <p>Emitting: ø0.265 x 1</p> <p>ø3.2 (PVC)</p> <p>ø5.3</p> <p>ø3</p> <p>ø2</p> <p>ø3.7</p> <p>ø1.6</p> <p>ø4</p> <p>ø2.2</p> <p>Width across flats 5.5</p> <p>thickness 1.8</p> <p>Toothed washer ø6.5</p> <p>Emitting side mark band</p>	<p>7-EL</p> <p>99</p> <p>6-UL</p> <p>90</p> <p>5-PL</p> <p>80</p> <p>4-LG</p> <p>70</p> <p>3-ST</p> <p>40</p> <p>2-FS</p> <p>20</p> <p>1-HS</p> <p>7</p>	<p>Long</p> <p>50</p> <p>Std</p> <p>25</p> <p>Fast</p> <p>14</p>	20	-20 to +60°C	R25	<p>NF-DB05</p> <p>Fine core</p>

●The sensing distances for the diffuse type fiber units are values on 500 × 500 mm white paper.

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Sleeve fiber units (diffuse type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
M3	ø0.82 sleeve: 15 mm long, Flexible Coaxial 	7-EL 240 6-UL 120 5-PL 100 4-LG 85 3-ST 60 2-FS 35 1-HS 10	Long 70 Std 40 Fast 15	15	-40 to +70°C	R4	NF-DT04
	ø0.82 sleeve: 15 mm long Flexible, Free cut 	7-EL 190 6-UL 125 5-PL 70 4-LG 65 3-ST 45 2-FS 25 1-HS 8	Long 40 Std 15 Fast 5	10	-40 to +70°C	R4	NF-DT02
Diffuse type	ø1.48 sleeve: 40 mm long, Free cut 	7-EL 195 6-UL 180 5-PL 160 4-LG 140 3-ST 90 2-FS 50 1-HS 15	Long 110 Std 50 Fast 30	40	-40 to +70°C	Fiber R25 Sleeve R10	NF-DB08 Bendable sleeve
	ø1.5 sleeve: 28 mm long, Free cut 	7-EL 450 6-UL 240 5-PL 220 4-LG 190 3-ST 120 2-FS 60 1-HS 16	Long 100 Std 60 Fast 30	45	-40 to +70°C	R15	NF-DT05
	ø1.5 sleeve: 90 mm long, Free cut 	7-EL 450 6-UL 240 5-PL 220 4-LG 190 3-ST 120 2-FS 60 1-HS 16	Long 120 Std 50 Fast 30	45	-40 to +70°C	Fiber R15 Sleeve R10	NF-DM03 Bendable sleeve
	ø1.48 sleeve: 40 mm long, Flexible, Free cut 	7-EL 140 6-UL 135 5-PL 110 4-LG 95 3-ST 65 2-FS 30 1-HS 10	Long 60 Std 35 Fast 17	30	-40 to +60°C	Fiber R1 Sleeve R10	NF-DR10 Bendable sleeve
	ø2.1 sleeve: 90 mm long, Heat resistant 	7-EL 1,110 6-UL 1,050 5-PL 910 4-LG 800 3-ST 520 2-FS 190 1-HS 50	Long 750 Std 250 Fast 80	200	-30 to +350°C or -60 to +200°C	Fiber R25 Sleeve R10	NF-DH05 Bendable sleeve

●The sensing distances for the diffuse type fiber units are values on 500 x 500 mm white paper.

●Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Photoelectric Sensors

Photoelectric Sensors

Specialized Photoelectric Sensors

Laser Displacement Sensors

Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

Retro-reflective

Small object detection

Screen/Array

Limited diffuse

Narrow view/
wafer mapping

Heat resistant

Chemical resistant

Vacuum resistant

Liquid level/liquid leakage/
water detectionLens for
through-beam type

Correct use

Sleeve fiber units (diffuse type)

Photoelectric Sensors

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Chemical resistant

Vacuum resistant

Liquid level/liquid leakage/water detection

Lens for through-beam type

Correct use

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Diffuse type	<p>ø2.5 sleeve: 40 mm long, Free cut</p>	7-EL 680 6-UL 630 5-PL 550 4-LG 480 3-ST 320 2-FS 180 1-HS 50	Long 400 Std 240 Fast 110	130	-40 to +70°C	Fiber R25 Sleeve R10	NF-DB06 Bendable sleeve
	<p>ø2.5 sleeve: 90 mm long, Free cut</p>	7-EL 1,100 6-UL 750 5-PL 750 4-LG 650	3-ST 450 2-FS 300 1-HS 80	150	-40 to +70°C	Fiber R25 Sleeve R20	NF-DB02 Bendable sleeve
	<p>ø2.8 sleeve: 60 mm long, Heat resistant</p>	7-EL 950 6-UL 900 5-PL 780 4-LG 680 3-ST 450 2-FS 200 1-HS 59	Long 650 Std 250 Fast 80	300	-30 to +350°C or -60 to +200°C	Fiber R25 Sleeve R10	NF-DH04 Bendable sleeve
	<p>ø0.5 sleeve: 3 mm long</p>	7-EL 28 6-UL 26 5-PL 23 4-LG 20 3-ST 13 2-FS 3 1-HS 1	Long 18 Std 5 Fast Unusable	3	-40 to +60°C	R10	NF-DP01 Fine core
	<p>ø0.82 sleeve: 5 mm long, Flexible</p>	7-EL 190 6-UL 125 5-PL 75 4-LG 65	3-ST 45 2-FS 25 1-HS 8	10	-40 to +70°C	R4	NF-DR05
	<p>ø0.82 sleeve: 80 mm long</p>	7-EL 90 6-UL 50 5-PL 45 4-LG 40	3-ST 25 2-FS 10 1-HS 4	7	-40 to +70°C	R25	NF-DR07
	<p>ø1.5 sleeve: 20 mm long, Free cut</p>	7-EL 400 6-UL 200 5-PL 190 4-LG 160	3-ST 100 2-FS 50 1-HS 16	45	-40 to +70°C	R15	NF-DK43 Low cost

- The sensing distances for the diffuse type fiber units are values on 500 x 500 mm white paper.
- Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

05

Sleeve type (side view)

Related
productsFiber units
Sleeve type
(Straight view)
P.43

Fiber amplifier

D3RF
P.110

Side angle light beam provides optimal detection in narrow places

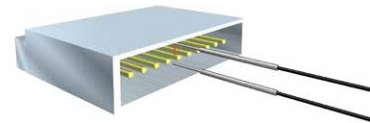
A wide range of variations including flexible types and heat resistant types



Possible to detect objects in narrow space Thin sleeve

The fine tipped side view sleeve type eliminates mounting space problems. Optimal for detection in complex areas, such as for connector pin detection.

Connector pin detection



Sleeve fiber units (through-beam type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Through-beam type	M3 ø1 sleeve: 10 mm long, Free cut 	7-EL 650 6-UL 450 5-PL 300 4-LG 250 3-ST 200 2-FS 100 1-HS 25	Long 200 Std 150 Fast 60	75	-40 to +70°C	R15	NF-TV04 Thin sleeve
	ø2 ø1 sleeve: 15 mm long, flexible, Free cut 	7-EL 160 6-UL 150 5-PL 130 4-LG 110 3-ST 76 2-FS 45 1-HS 11	Long 90 Std 50 Fast 25	20	-40 to +60°C	R1	NF-TG05 Thin sleeve
	ø2.5 ø1 sleeve: 10 mm long, Free cut 	7-EL 650 6-UL 450 5-PL 300 4-LG 250 3-ST 200 2-FS 100 1-HS 25	Long 200 Std 150 Fast 60	75	-40 to +70°C	R15	NF-TV02 Thin sleeve
	ø2.5 ø1 sleeve: 27 mm long, Heat resistant 	7-EL 450 6-UL 260 5-PL 240 4-LG 200 3-ST 140 2-FS 70 1-HS 20	Long 120 Std 80 Fast 50	50	-40 to +200°C	R30	NF-TH04S-27V2 (Made-to-order products) Thin sleeve

• Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

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SensorsSpecialized
Photoelectric
SensorsLaser
Displacement
Sensors

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Flexible R1/R2

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resistantVacuum
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water detectionLens for
through-beam type

Correct use

Sleeve fiber units (through-beam type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Through-beam type	<p>ø1.5 sleeve: 25 mm long, Heat resistant Fiber length: 300 mm and 400 mm (each fiber)</p>	<p>7-EL 1,600 850 800 600 400 200 60</p>	<p>Long 350 Std 250 Fast 150</p>	150	-40 to +200°C	R30	<p>NF-TH05S-A</p> <p>Made-to-order products</p>
	<p>ø2 sleeve: 20 mm long, Free cut</p>	<p>7-EL 2,000 6-UL 1,300 5-PL 1,000 4-LG 900</p>	<p>3-ST 600 2-FS 800 Std 400 1-HS 100 Fast 200</p>	320	-40 to +70°C	R25	NF-TV01
	<p>ø2 sleeve: 20 mm long 5 m long, Free cut</p>	<p>7-EL 1,700 6-UL 1,100 5-PL 850 4-LG 750</p>	<p>3-ST 500 2-FS 600 Std 250 1-HS 85 Fast 300 150</p>	200	-40 to +70°C	R25	NF-TV01-5

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Sleeve fiber units (diffuse type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Diffuse type	M6 ø2.7 sleeve: 20 mm long, Free cut 	7-EL 680 6-UL 400 5-PL 350 4-LG 300 3-ST 200 2-FS 100 1-HS 30	Long 200 Std 120 Fast 50	90	-40 to +70°C	R25	NF-DV03
	ø2.7 sleeve: 20 mm long, Free cut 	7-EL 680 6-UL 400 5-PL 350 4-LG 300 3-ST 200 2-FS 100 1-HS 30	Long 200 Std 120 Fast 50	90	-40 to +70°C	R25	NF-DV01
	ø2 sleeve: 15 mm long, Flexible, Free cut 	7-EL 53 6-UL 50 5-PL 43 4-LG 36 3-ST 20 2-FS 12 1-HS 4	Long 25 Std 12 Fast 5	10	-40 to +60°C	R1	NF-DR12
	ø2.8 sleeve: 10 mm long, Free cut 	7-EL 230 6-UL 110 5-PL 85 4-LG 75 3-ST 55 2-FS 30 1-HS 8	Long 80 Std 30 Fast 7	15	-40 to +70°C	R15	NF-DV02
	ø5 ø2.7 sleeve: 65 mm long, Free cut 	7-EL 680 6-UL 400 5-PL 350 4-LG 300 3-ST 200 2-FS 100 1-HS 30	Long 200 Std 120 Fast 50	90	-40 to +70°C	R25	NF-DK33

●The sensing distances for the diffuse type fiber units are values on 500 × 500 mm white paper

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

06

Flexible R4/R2 (R4 mm, R2 mm)

**Related
products**

Fiber units

**Flexible R1
(R1 mm)**
● P.52

Fiber units

**Flexible R2
(R2 mm)**
● P.58


Flexible type fiber units can be mounted at moving parts

Withstands 800,000 cycle bending test

Limited diffuse reflective types optimized for glass substrate alignment is also available

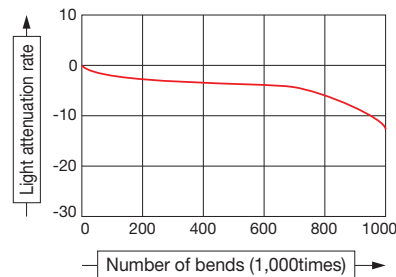
Withstands 800,000 cycle bending test

Withstands 800,000 cycle bending test at a load of 50 g !*

Because of high photo-conductivity with a less than 10% light deterioration rate, this sensor is optimal for mounting on moving parts such as robot arms.

*Measurement conditions: Bending angle of 90°, load of 50 g, bending radius of 4 mm, light attenuation rate of less than 10%

Bend cycles and light attenuation rate



Flexible fiber units (through-beam type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Min. bending radius (mm)	Model
		D3RF	D2RF	BRF			
Through-beam type	Free cut 	7-EL 850 6-UL 275 5-PL 150 4-LG 50 400	3-ST Long 350 2-FS Std 200 1-HS Fast 90	110	-40 to +70°C	R4	NF-TR02
	Lens attachable (P.98), Free cut 	7-EL 4,000 6-UL 850 5-PL 1,800 4-LG 500 1,400 1,200	3-ST Long 800 2-FS Std 400 1-HS Fast 250	330	-40 to +70°C	R4	NF-TR01 Standard item
	Fine 	7-EL 54 6-UL 25 5-PL 15 4-LG 5 38	3-ST Long 30 2-FS Std 18 1-HS Fast 8	10	-40 to +60°C	R4	NF-TR04
	Fine, Free cut 	7-EL 850 6-UL 275 5-PL 150 4-LG 50 400	3-ST Long 350 2-FS Std 200 1-HS Fast 90	110	-40 to +70°C	R4	NF-TR03

●Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

**Photoelectric
Sensors**

 Photoelectric
Sensors

 Specialized
Photoelectric
Sensors

 Laser
Displacement
Sensors

Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

Retro-reflective

Small object
detection

Screen/Array

Limited diffuse

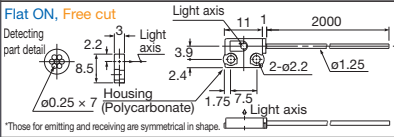
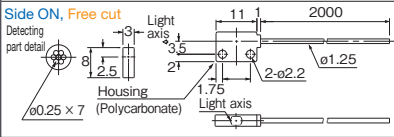
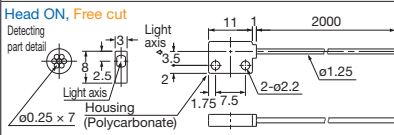
Narrow view/
wafer mapping

Heat resistant

Chemical
resistantVacuum
resistantLiquid level/liquid leakage/
water detectionLens for
through-beam type

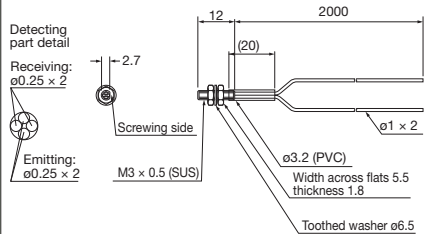
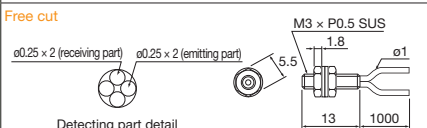
Correct use

Flexible fiber units (through-beam type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Min. bending radius (mm)	Model	
		D3RF	D2RF	BRF				
Through-beam type	<div>Flat ON, Free cut</div> <div></div>	7-EL 1,600 6-UL 1,510 5-PL 1,320 4-LG 1,150	3-ST 750 2-FS 410 1-HS 130	Long 750 Std 450 Fast 280	300	-40 to +60°C	R4	NF-TE05
	<div>Side ON, Free cut</div> <div></div>	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,150	3-ST 2,000 2-FS 1,100 1-HS 320	Long 2,700 Std 1,300 Fast 600	1,100	-40 to +60°C	R4	NF-TR05
	<div>Head ON, Free cut</div> <div></div>	7-EL 3,600 6-UL 3,600 5-PL 3,580 4-LG 3,060	3-ST 1,980 2-FS 1,400 1-HS 500	Long 2,700 Std 1,600 Fast 850	1,100	-40 to +60°C	R4	NF-TR06

●Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

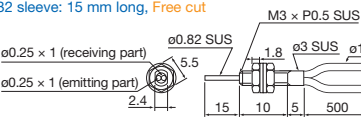
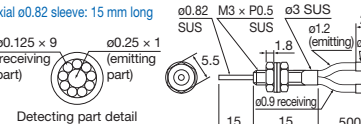
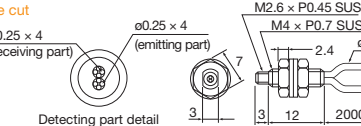
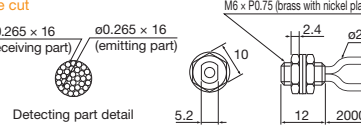
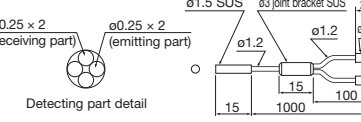
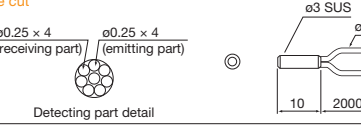
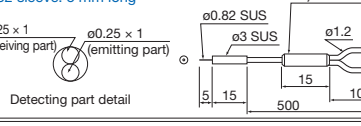
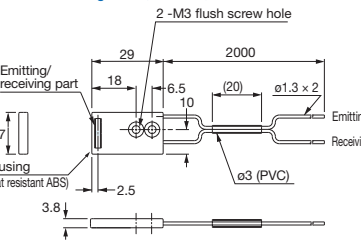
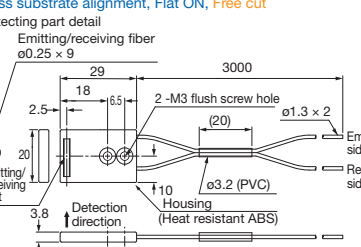
Flexible fiber units (diffuse type)

Type		Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Min. bending radius (mm)	Model
			D3RF	D2RF	BRF			
Diffuse type	M3	<p>Free cut</p> 	7-EL 88 6-UL 80 5-PL 70 4-LG 60 3-ST 40 2-FS 20 1-HS 7	Long 40 Std 20 Fast 14	20	-40 to +70°C	R4	NF-DR08
		<p>Free cut</p> 	7-EL 300 6-UL 180 5-PL 130 4-LG 100	3-ST 80 2-FS 45 1-HS 16	Long 70 Std 30 Fast 15	20	-40 to +70°C	R4

●The sensing distances for the diffuse type fiber units are values on 500 × 500 mm white paper.

●Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Flexible fiber units (diffuse type/limited diffuse reflective type)

Type		Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Min. bending radius (mm)	Model
			D3RF		D2RF	BRF		
Diffuse type	M3	ø0.82 sleeve: 15 mm long, Free cut 	7-EL 190 6-UL 125 5-PL 70 4-LG 65	3-ST 45 2-FS 25 1-HS 8	Long 40 Std 15 Fast 5	10	-40 to +70°C	R4 NF-DT02
		Coaxial ø0.82 sleeve: 15 mm long 	7-EL 240 6-UL 120 5-PL 100 4-LG 85	3-ST 60 2-FS 35 1-HS 10	Long 70 Std 40 Fast 15	15	-40 to +70°C	R4 NF-DT04
	M4	Free cut 	7-EL 300 6-UL 180 5-PL 140 4-LG 120	3-ST 80 2-FS 45 1-HS 16	Long 120 Std 50 Fast 25	35	-40 to +70°C	R4 NF-DR06
		Free cut 	7-EL 1,100 6-UL 700 5-PL 600 4-LG 500	3-ST 350 2-FS 230 1-HS 70	Long 350 Std 200 Fast 80	130	-40 to +70°C	R4 NF-DR01 Standard item
	ø1.5		7-EL 300 6-UL 180 5-PL 150 4-LG 130	3-ST 80 2-FS 45 1-HS 18	Long 70 Std 30 Fast 15	20	-40 to +70°C	R4 NF-DR04
		ø3	Free cut 	7-EL 450 6-UL 250 5-PL 190 4-LG 160	3-ST 120 2-FS 70 1-HS 25	Long 120 Std 50 Fast 25	35	-40 to +70°C
ø0.82 sleeve: 5 mm long 	7-EL 190 6-UL 125 5-PL 75 4-LG 65		3-ST 45 2-FS 25 1-HS 8	Long 40 Std 15 Fast 5	10	-40 to +70°C	R4 NF-DR05	
Limited diffuse reflective type	Square	Glass substrate alignment, Flat ON, Free cut 	7-EL 0 to 23 6-UL 0 to 23 5-PL 0 to 22 4-LG 0 to 22 3-ST 0 to 21 2-FS 0 to 20 1-HS 5 to 13	Long 0 to 23 Std 0 to 17 Fast 0 to 12	15	0 to +70°C	R4 NF-DC06	
		Glass substrate alignment, Flat ON, Free cut 	7-EL 0 to 38 6-UL 0 to 38 5-PL 0 to 38 4-LG 0 to 38 3-ST 0 to 34 2-FS 0 to 31 1-HS 4 to 22	Long 0 to 36 Std 0 to 30 Fast 0 to 15	Unusable	0 to +70°C	R4 NF-DC04	

●The sensing distances for the diffuse type fiber units are values on 500 × 500 mm white paper.

●Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Photoelectric Sensors

Photoelectric Sensors

Specialized Photoelectric Sensors

Laser Displacement Sensors

Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

Retro-reflective

Small object detection

Screen/Array

Limited diffuse

Narrow view/wafer mapping

Heat resistant

Chemical resistant

Vacuum resistant

Liquid level/liquid leakage/water detection

Lens for through-beam type

Correct use

07

Flexible R1 (R1 mm)

Related
products

Fiber units
Flexible R4/R2
(R4 mm, R2 mm)
P.49

Fiber units
Flexible R2
(R2 mm)
P.58



Fiber with 1 mm bending radius for the smallest possible bends

- Extra space is unnecessary as the bending radius is 1 mm. Also prevents snagging.
- Over 20 types are available, including through-beam types and diffuse types

Thanks to highly-flexible fibers

The fiber unit for the flexible type (R1 mm) has an allowable bending radius of 1 mm ! Cable can be installed without worrying about damaging the fiber.

*If fibers are to be bent repeatedly, such as when mounted on moving parts, please select a flexible fiber→P.49

Standard fiber



Space is needed because the bending radius is large. Also, you may have problems when snagged.

Flexible fiber



Extra space is unnecessary as the bending radius is 1 mm. No more worrying about snagging.

Flexible R1 mm fiber units (through-beam type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Through-beam type	Lens attachable (P98), Free cut 	7-EL 3-ST 4,000 6-UL 2,000 5-PL 1,600 4-LG 1,400 3-ST 1,000 2-FS 550 1-HS 180	Long 800 Std 400 Fast 200	360	-40 to +60°C	R1	NF-TK77 Low cost
	Nut type, Free cut 	7-EL 1,530 6-UL 1,440 5-PL 1,260 4-LG 1,000 3-ST 720 2-FS 420 1-HS 140	Long 800 Std 450 Fast 250	300	-40 to +60°C	R1	NF-TR08
	Nut type, Lens installed, Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,150 3-ST 1,980 2-FS 1,000 1-HS 320	Long 2,300 Std 1,300 Fast 550	800	-40 to +60°C	R1	NF-TR09
	ø1 sleeve: 15 mm long, Side view, Free cut 	7-EL 160 6-UL 150 5-PL 130 4-LG 110 3-ST 76 2-FS 45 1-HS 11	Long 90 Std 50 Fast 25	20	-40 to +60°C	R1	NF-TG05
	Lens installed, Free cut 	7-EL 3-ST 3,600 1,800 6-UL 2-FS 3,600 1,000 5-PL 1-HS 3,150 340 4-LG 2,790	Long 2,300 Std 1,300 Fast 550	550	-40 to +60°C	R1	NF-TR10
	Side view, Free cut 	7-EL 3-ST 3,500 2,000 6-UL 2-FS 3,500 1,000 5-PL 1-HS 3,500 300 4-LG 3,000	Long 1,800 Std 1,000 Fast 500	700	-40 to +70°C	R1	NF-TS22V
	Narrow view, Side view, Free cut 	7-EL 3-ST 3,600 2,100 6-UL 2-FS 3,600 1,500 5-PL 1-HS 3,600 520 4-LG 3,300	Long 2,500 Std 1,600 Fast 800	1,000	-40 to +60°C	R1	NF-TG02

●Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Photoelectric Sensors

Photoelectric Sensors

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Laser Displacement Sensors

Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

Retro-reflective

Small object detection

Screen/Array

Limited diffuse

Narrow view/wafer mapping

Heat resistant

Chemical resistant

Vacuum resistant

Liquid level/liquid leakage/water detection

Lens for through-beam type

Correct use

Flexible R1 mm fiber units (through-beam type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Screen	11 mm wide screen, Side ON, Free cut 	7-EL 3,700 6-UL 3,000 5-PL 3,000 4-LG 3,000 3-ST 2,500 2-FS 2,000 1-HS 1,000	Long 3,000 Std 2,500 Fast 1,200	2,000	-40 to +55°C	R1	NF-TZ09 <div>Renewal</div> <div>Collimated light</div>
	32 mm wide screen, Side ON, Free cut 	7-EL 3,700 6-UL 3,700 5-PL 3,700 4-LG 3,700 3-ST 3,700 2-FS 3,000 1-HS 2,500	Long 3,700 Std 3,000 Fast 2,500	2,500	-40 to +55°C	R1	NF-TZ07 <div>Renewal</div> <div>Collimated light</div>
Through-beam type	Flat ON, Free cut 	7-EL 1,190 6-UL 1,120 5-PL 980 4-LG 850 3-ST 550 2-FS 310 1-HS 100	Long 600 Std 350 Fast 200	220	-40 to +60°C	R1	NF-TE01
	Head ON/Side ON switchable type, Free cut 	7-EL 430 6-UL 400 5-PL 350 4-LG 300 3-ST 190 2-FS 120 1-HS 36	Long 250 Std 120 Fast 55	110	-40 to +60°C	R1	NF-TE02 <div>Switchable direction</div>
	Flat ON, Free cut 	7-EL 1,890 6-UL 1,770 5-PL 1,540 4-LG 1,350 3-ST 880 2-FS 520 1-HS 170	Long 900 Std 500 Fast 350	450	-40 to +60°C	R1	NF-TE03

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Flexible R1 mm fiber units (through-beam type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Through-beam type	Flat ON/Head ON switchable type, Free cut 	7-EL 1,340 6-UL 1,260 5-PL 1,090 4-LG 960 3-ST 630 2-FS 390 1-HS 130	Long 750 Std 450 Fast 250	280	-40 to +60°C	R1	NF-TE04 Switchable direction
	Flat ON, Free cut 	7-EL 2,450 6-UL 2,300 5-PL 2,010 4-LG 1,710 3-ST 1,150 2-FS 650 1-HS 220	Long 1,200 Std 650 Fast 330	500	-40 to +60°C	R1	NF-TR13
	Side ON, Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,150 3-ST 2,000 2-FS 1,200 1-HS 540	Long 2,700 Std 1,500 Fast 1,000	1,300	-40 to +60°C	R1	NF-TR12
	Head ON, Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,580 4-LG 3,060 3-ST 1,980 2-FS 1,350 1-HS 530	Long 2,700 Std 1,600 Fast 850	1,600	-40 to +60°C	R1	NF-TR11

●Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Photoelectric Sensors

Photoelectric Sensors

Specialized Photoelectric Sensors

Laser Displacement Sensors

Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

Retro-reflective

Small object detection

Screen/Array

Limited diffuse

Narrow view/wafer mapping

Heat resistant

Chemical resistant

Vacuum resistant

Liquid level/liquid leakage/water detection

Lens for through-beam type

Correct use

Flexible R1 mm fiber units (diffuse type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
M4	ø1.48 sleeve: 40 mm long, Free cut 	7-EL 140 6-UL 135 5-PL 110 4-LG 95 3-ST 65 2-FS 30 1-HS 10	Long 60 Std 35 Fast 17	30	-40 to +60°C	Fiber R1 Sleeve R10	NF-DR10 Bendable sleeve
	ø2 sleeve: 15 mm long, Side view, Free cut 	7-EL 53 6-UL 50 5-PL 43 4-LG 36 3-ST 20 2-FS 12 1-HS 4	Long 25 Std 12 Fast 5	10	-40 to +60°C	R1	NF-DR12
Square	Long range detection, Free cut 	7-EL 1,070 6-UL 990 5-PL 880 4-LG 770 3-ST 500 2-FS 310 1-HS 90	Long 600 Std 380 Fast 200	250	-40 to +60°C	R1	NF-DR09
	Flat ON, Free cut 	7-EL 140 6-UL 135 5-PL 110 4-LG 99 3-ST 70 2-FS 34 1-HS 10	Long 60 Std 30 Fast 10 to 16	30	-40 to +60°C	R1	NF-DE01
	Flat ON, Free cut 	7-EL 490 6-UL 450 5-PL 400 4-LG 350 3-ST 225 2-FS 117 1-HS 41	Long 250 Std 100 Fast 60	100	-40 to +60°C	R1	NF-DE03
	Head ON/Side ON switchable type, Free cut 	7-EL 160 6-UL 150 5-PL 130 4-LG 117 3-ST 77 2-FS 43 1-HS 12	Long 65 Std 35 Fast 20	30	-40 to +60°C	R1	NF-DE02 Switchable direction

●The sensing distances for the diffuse type fiber units are values on 500 × 500 mm white paper.

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Photoelectric Sensors

[illegible]

- The sensing distances for the diffuse type fiber units are values on 500 × 500 mm white paper.
- Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Photoelectric Sensors

Specialized
Photoelectric
Sensors

Laser Displacement Sensors

Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

Retro-reflective

Small object detection

Screen/Array

Limited diffuse

Narrow view/
wafer mapping

Heat resistant

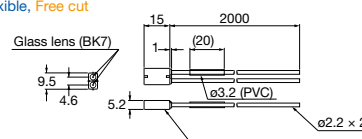
Chemical

Vacuum

Liquid level/liquid leakage/
water detection

Lens for
through-beam type

Correct use

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Retro-reflective type	<p>Flexible, Free cut</p> 	<p>7-EL 1,390</p> <p>6-UL 1,300</p> <p>5-PL 1,140</p> <p>4-LG 990</p> <p>3-ST 640</p> <p>2-FS 520</p> <p>1-HS 260</p>	<p>Long 850</p> <p>Std 750</p> <p>Fast 10 to 550</p>	<p>600</p>	<p>-25 to +55°C</p>	<p>R1</p>	<p>NF-RR01</p>

- Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

OPTEX
FE

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Limited diffuse reflective type	<p>Ultra-small, Flexible, Free cut</p>	7-EL 0 to 9 6-UL 0 to 8 5-PL 0 to 7 4-LG 0 to 6 3-ST 2 to 5 2 to 3 1-HS 1 to 2	Long 1 to 7 Std 1 to 5.5 Fast 1 to 3	3	-20 to +60°C	R1	NF-DC08

- Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

08

Flexible R2 (R2 mm)

Related
productsFiber units
Flexible R1
(R1 mm)
P.52Fiber units
Flexible R4/R2
(R4 mm, R2 mm)
P.49

Easy to handle fiber with a bending radius of 2 mm

Adjustable mounting type that switches between straight view and side view also available

40 mm wide screen fiber type is available

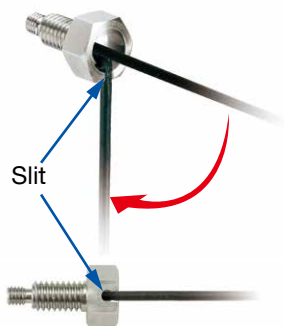
New concept Straight view/side view switchable type

Switchable direction

The NF-TR14 can be used as a side view type by bending the fiber cable to fit the slit in the side of the nut. This fiber unit is a completely new concept that allows switching between side view and straight view according to mounting conditions.

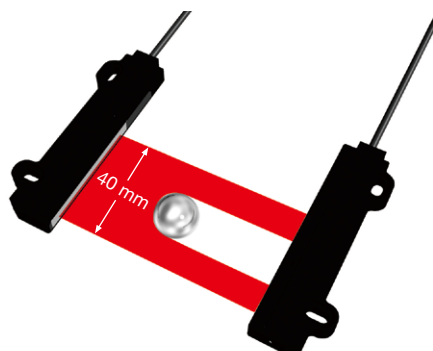
For straight view

For side view



40 mm wide screen type

The NF-TS40 is a through-beam type capable of detecting within a 40 mm wide area. It emits collimated light like that of a laser beam even at a 40 mm width thanks to its unique optical design. This fiber unit demonstrates its strength in the detection of workpieces with complex shapes and in detecting falling objects.



Other screen array fibers→P.66

Flexible R2 mm fiber units (through-beam type/diffuse type)

Type		Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
			D3RF	D2RF	BRF			
Through-beam type	M4	Nut type, Straight view/side view switchable type, Free cut 	7-EL 3,800 6-UL 2,700 5-PL 2,200 4-LG 1,800	3-ST 1,200 2-FS 1,300 Std 600 Fast 300	400	-40 to +60°C	R2	NF-TR14 Switchable direction
		Nut type, Free cut 	7-EL 2,000 6-UL 1,000 5-PL 950 4-LG 800	3-ST 550 2-FS 250 1-HS 80	270	-40 to +70°C	R2	NF02-TK Space-saving
	ø3	Free cut 	7-EL 4,000 6-UL 2,000 5-PL 1,600 4-LG 1,400	3-ST 1,000 2-FS 550 1-HS 180	360	-40 to +70°C	R2	NF-TK05
	Screen	40 mm wide screen, Side ON, Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,600 3-ST 3,600 2-FS 3,600 1-HS 3,600 Fast 2,500	Long 3,600 Std 3,600 Fast 3,000	3,600	-40 to +60°C	R2	NF-TS40 Collimated light
Diffuse type	M4	Free cut 	7-EL 1,200 6-UL 750 5-PL 650 4-LG 550	3-ST 400 2-FS 250 1-HS 80	110	-40 to +70°C	R2	NF-DK66
		Free cut 	7-EL 1,200 6-UL 750 5-PL 650 4-LG 550	3-ST 400 2-FS 250 1-HS 80	110	-40 to +70°C	R2	NF-DK67
	M6	Nut type, Free cut 	7-EL 550 6-UL 330 5-PL 230 4-LG 200 3-ST 150 2-FS 90 1-HS 18	Long 65 Std 45 Fast 10	15	-40 to +70°C	R2	NF02-DK Space-saving
		ø3	Free cut 	7-EL 850 6-UL 550 5-PL 450 4-LG 375	3-ST 275 2-FS 170 1-HS 55	110	-40 to +70°C	R2
	ø3	Coaxial, Free cut 	7-EL 270 6-UL 250 5-PL 210 4-LG 180	3-ST 120 2-FS 60 1-HS 20	55	-40 to +60°C	R2	NF-DR11

●The sensing distances for the diffuse type fiber units are values on 500 × 500 mm white paper (1000 × 1000 mm white paper for NF02-DK).

●Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Photoelectric Sensors

Photoelectric Sensors

Specialized Photoelectric Sensors

Laser Displacement Sensors

Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

Retro-reflective

Small object detection

Screen/Array

Limited diffuse

Narrow view/wafer mapping

Heat resistant

Chemical resistant

Vacuum resistant

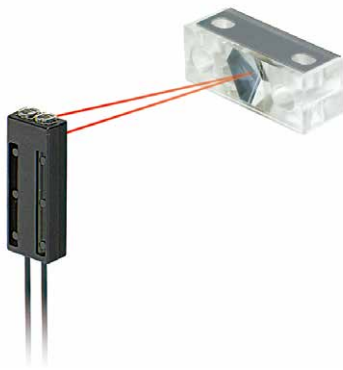
Liquid level/liquid leakage/water detection

Lens for through-beam type

Correct use

09

Retro-reflective type

Related
productsFiber amplifier
D3RF
P.110Fiber amplifier
BRF
P.130

Stable detection of transparent workpieces

- Built-in polarizing filter type and narrow view type available
- Extremely thin design with a thickness of just 2 mm.
- Wafer mapping with retro-reflective type.
(NF-RG01)

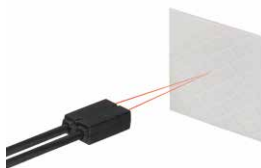
Stable detection of transparent workpieces

Built-in polarizing filter type and narrow view type

NF-RR01 with a built-in polarizing filter is minimally affected by reflected light from the surface of glass or film. NF-RB02 (Side ON) with narrow view design is also available. Please select based on the application.

NF-RR01 (built-in polarizing filter type)

NF-RB02 (narrow view, Side ON)



Wafer mapping with retro-reflective type

Ultra-thin fiber units and reflectors

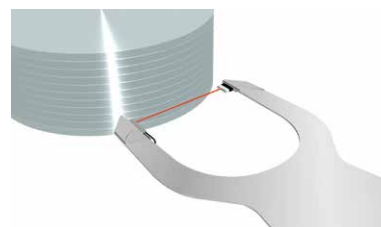
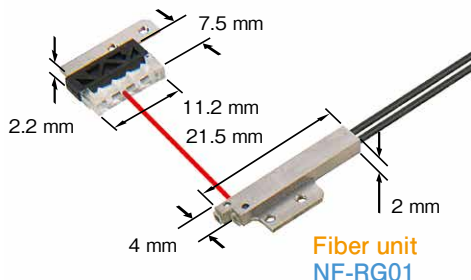
Ultra-thin

Ultra-thin design with a thickness of just 2 mm. Wafer mapping that was only possible on through-beam types which require much cable installation made possible on retro-reflective types. Of course since this is a space-saving side view type, the fiber cable can be easily handled.

*Reflector thickness is 2.2 mm.

Reflector (included)

Mounting on robot arm



Wafer mapping with the NF-RG01 retro-reflective type.

This type allows for a reduction in the required work hours for cable installation and processing work hours compared to a through-beam type.

Photoelectric
SensorsSpecialized
Photoelectric
SensorsLaser
Displacement
Sensors

Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

Retro-reflective

Small object
detection

Screen/Array

Limited diffuse

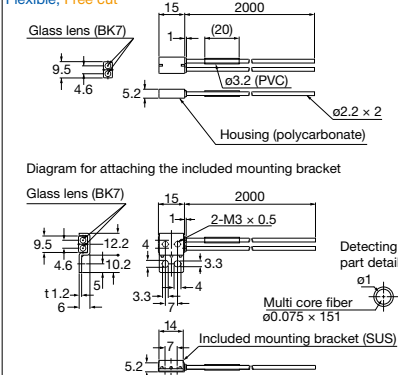
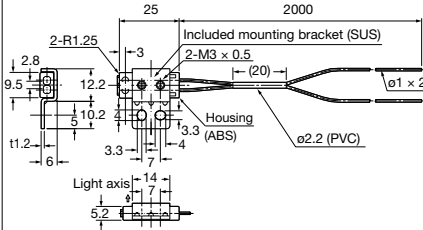
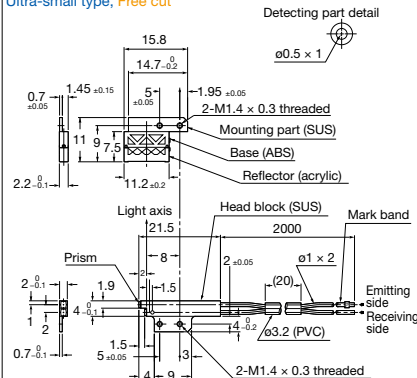
Narrow view/
wafer mapping

Heat resistant

Chemical
resistantVacuum
resistantLiquid level/liquid leakage/
water detectionLens for
through-beam type

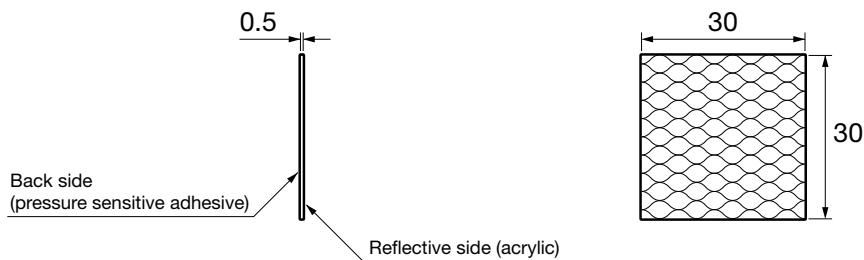
Correct use

Retro-reflective type fiber units (built-in polarizing filter/narrow view/wafer mapping)

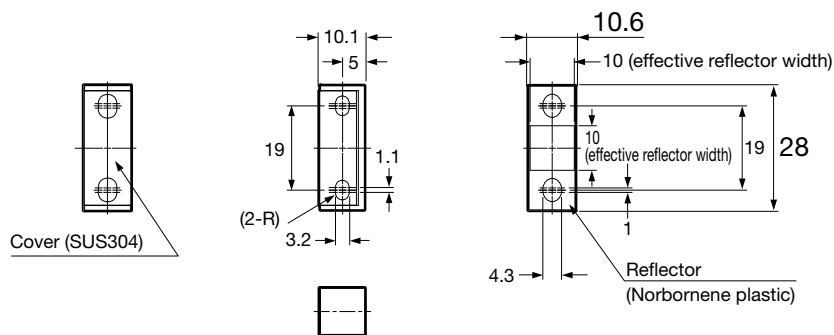
Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Built-in polarizing filter	<p>Flexible, Free cut</p>  <p>Diagram for attaching the included mounting bracket</p> <p>Glass lens (BK7)</p> <p>Detecting part detail</p> <p>Multi core fiber ø0.075 x 151</p> <p>Included mounting bracket (SUS)</p>	7-EL 1,390 6-UL 1,300 5-PL 1,140 4-LG 990 3-ST 640 2-FS 520 1-HS 260	Long 850 Std 750 Fast 10 to 550	600	-25 to +55°C	R1	NF-RR01
	Narrow view	<p>Side ON, Free cut</p>  <p>Light axis</p>	7-EL 410 6-UL 380 5-PL 340 4-LG 290 3-ST 180 2-FS 150 1-HS 90	Long 250 Std 200 Fast 200	200	-40 to +60°C	R10
Wafer mapping	<p>Ultra-small type, Free cut</p>  <p>Detecting part detail</p> <p>Light axis</p> <p>Mark band</p> <p>Emitting side</p> <p>Receiving side</p>	7-EL 590 6-UL 550 5-PL 480 4-LG 420 3-ST 270 2-FS 180 1-HS 70	Long 350 Std 230 Fast 230	Unusable	-40 to +60°C	R10	NF-RG01 Ultra-thin

Reflector dimensions

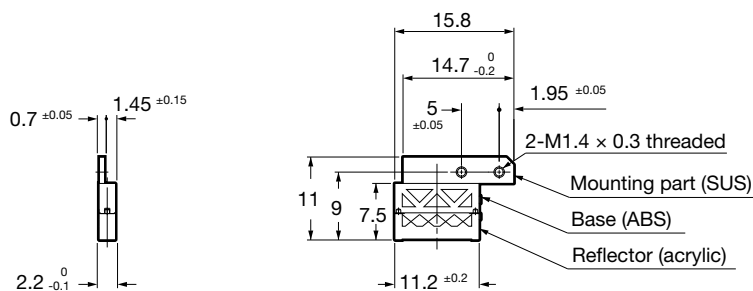
■ **DG3030** (NF-RR01 included reflective sheet)



■ **P31** (NF-RB02 included reflector)



■ **NF-RG01** included reflector



10

Small object detection

Related
products

Fiber amplifier

D3RF
P.110



Fiber amplifier

BRF
P.130



Small object detection with spot lens and fine core

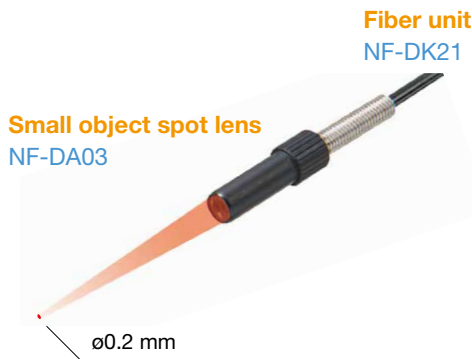


A small spot focus lens with adjustable spot size is available

Suitable for handling small objects with a $\varnothing 0.125$ mm fine core (NF-TP01, NF-DP01)

Stable detection of small objects with spot lens

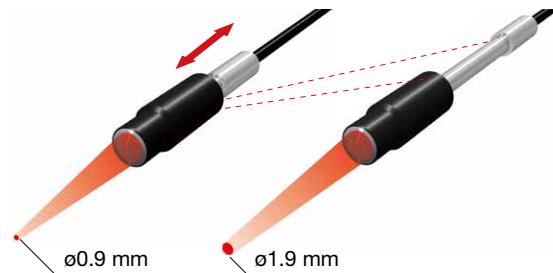
Fine spot lens [NF-DA03](#) and coaxial diffuse fiber unit [NF-DK21](#) enables $\varnothing 0.2$ mm spot.



Adjustable spot size

The [NF-DA06](#) comes with a small spot lens where sensing distance and spot size can be adjusted through the amount of fiber inserted. It is possible to change the spot size between $\varnothing 0.9$ and 1.9 mm with a distance of between 20 and 40 mm. The [NF-DA07](#), with its space-saving side view, is also available.

Adjustable spot size



Detects small objects with a core diameter of $\varnothing 0.125$ mm

Fine core

The [NF-TP01](#) through-beam type and the [NF-DP01](#) diffuse type use a $\varnothing 0.125$ mm fine core. Suitable for small object detection. The position of the fiber can be easily adjusted by attaching a sleeve.

[NF-TP01](#) Fine core diameter: $\varnothing 0.125$ mm



[NF-DP01](#) Fine core diameter: $\varnothing 0.125$ mm (4 cores)



Photoelectric
Sensors

Photoelectric
Sensors

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Photoelectric
Sensors

Laser
Displacement
Sensors

Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

Retro-reflective

Small object
detection

Screen/Array

Limited diffuse

Narrow view/
wafer mapping

Heat resistant

Chemical
resistant

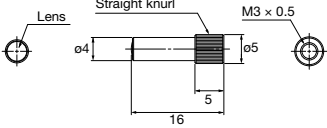
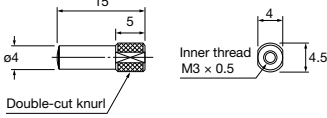
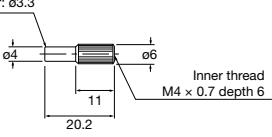
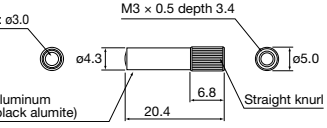
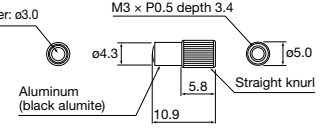
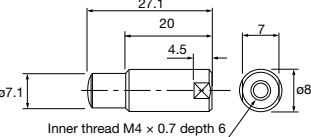
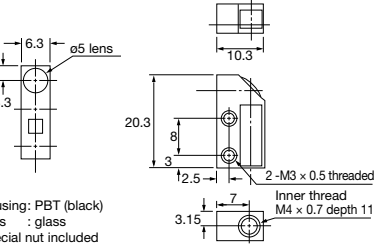
Vacuum
resistant

Liquid level/liquid leakage/
water detection

Lens for
through-beam type

Correct use

Small object detection lens (for diffuse type fibers)

Type	Features/dimensions (unit: mm)	Spot size and supported fiber Parentheses indicate dia. of the smallest detectable object	Center sensing distance	Ambient temperature	Model
Small object spot lens	Housing: aluminum (black alumite) Lens : acrylic 	Approx. $\phi 0.2$ mm: NF-DK21 Approx. $\phi 0.4$ mm: NF-DT01 ($\phi 0.005$ mm metal wire)	7 mm	-20 to +60°C	NF-DA03 Small
	Housing: aluminum (black alumite) Lens : glass 	Approx. $\phi 0.3$ mm: NF-DK21 Approx. $\phi 0.5$ mm: NF-DT01 ($\phi 0.005$ mm metal wire)	7.5 mm	-40 to +70°C	NF-DA04
Small spot lens	Lens diameter: $\phi 3.3$  Housing: aluminum (black alumite) Lens : glass	Approx. $\phi 0.5$ mm: NF-DM02 ($\phi 0.005$ mm metal wire)	6 mm	-40 to +70°C	NF-DA05
	Lens diameter: $\phi 3.0$ 	Approx. $\phi 0.2$ mm: NF-DK21 ($\phi 0.005$ mm metal wire) Approx. $\phi 0.4$ mm: NF-DT01 ($\phi 0.01$ mm metal wire)	6 mm	-40 to +70°C	NF-DA01
	Lens diameter: $\phi 3.0$ 	Approx. $\phi 1.2$ mm: NF-DK21 ($\phi 0.005$ mm metal wire) Approx. $\phi 1.4$ mm: NF-DT01 ($\phi 0.01$ mm metal wire)	15 mm	-40 to +70°C	NF-DA02
Spot size Adjustable lens	 Housing: aluminum (black alumite) Lens : glass	Approx. $\phi 0.9$ to 1.9 mm: NF-DM02-G4 ($\phi 0.2$ mm metal wire)	Approx. 20 to 40 mm	-40 to +70°C	NF-DA06
Side view Lens with adjustable spot size	 Housing: PBT (black) Lens : glass Special nut included	Approx. $\phi 0.8$ to 3.2 mm: NF-DM02-G4 ($\phi 0.1$ mm metal wire)	Approx. 9 to 17 mm	-40 to +70°C	NF-DA07

- Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.
- The values for the smallest detectable object are typical values when set for the best to detect small objects on the fiber amplifier side.

Photoelectric Sensors

●The values for the smallest detectable object are typical values when set for the best to detect small objects on the fiber amplifier side.

11

Screen/Array

Related
products

Fiber amplifier

D3RF
P.110

Fiber amplifier

BRF
P.130Photoelectric
SensorsSpecialized
Photoelectric
SensorsLaser
Displacement
Sensors

Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

Retro-reflective

Small object
detection

Screen/Array

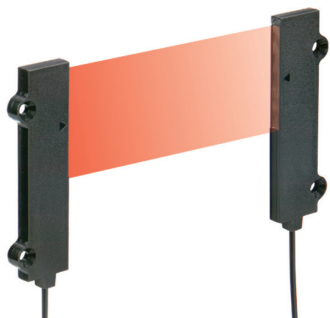
Limited diffuse

Narrow view/
wafer mapping

Heat resistant

Chemical
resistantVacuum
resistantLiquid level/liquid leakage/
water detectionLens for
through-beam type

Correct use

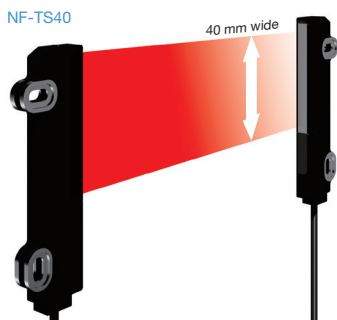
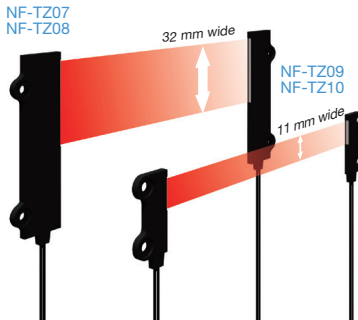
Fiber units for detecting with light
screenOptimal for detection of complex shapes and when
workpiece passage locations are not fixed.

Screen fiber

New through-beam type

New models for 32 mm wide and 11 mm wide types in addition to new 40 mm wide type. Five models are available as optimal solutions for the detection of workpieces with complex shapes, as well as for the detection of workpiece passage locations and shapes that are not fixed.

NF-TS40

NF-TZ07
NF-TZ08NF-TZ09
NF-TZ10

Upgrades from the previous model

NF-TZ08	Bending radius changed from R10 mm
NF-TZ10	to a flexible R2 mm.

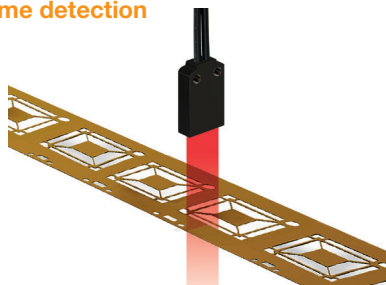
*Small changes only in sensing distance for NF-TZ09.

Slit masks for small object detection and short-distance light saturation are included for NF-TZ07, -TZ08, -TZ09, and -TZ10

Head ON diffuse type

The NF-DZ01 diffuse type enables a detection area with a spot size of 2×15 mm (at a distance of 15 mm). Optimal for the detection of workpieces with complex shapes and drilled workpieces such as lead frames.

Lead frame detection



Collimated light like laser beam

Collimated light like laser beam achieved through unique optical design. Because there is little light leakage even for mounting in complex areas, superior detection stability is achieved.

Difference between screen fiber and array fiber

Screen fiber Collimated light

This screen fiber collimates light into a band through the lens.

Able to detect finer light differences than array fibers as a through-beam type due to collimated light.

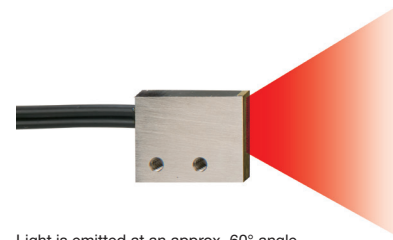


Light path: almost parallel.

Array fiber

This array fiber aligns the fiber cores and emits light in a band.

Easy to perform light axis adjustment as a through-beam type because the light expands. Because there is more light received when detecting small objects at a short-distance when using diffuse types as compared to screen fibers, stable detection is possible.



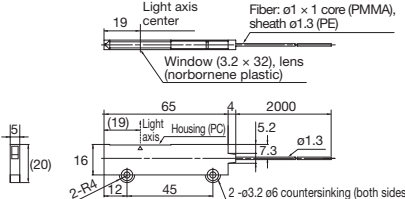
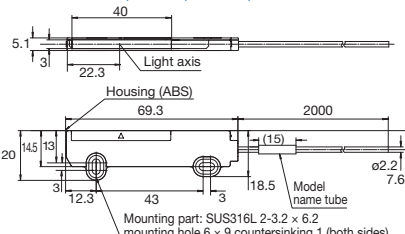
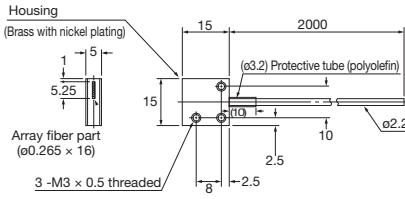
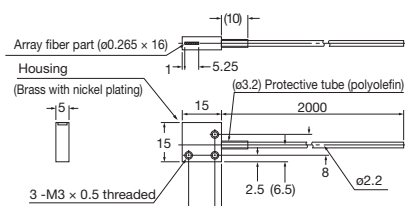
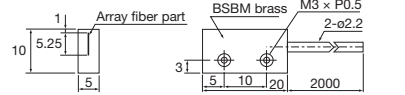
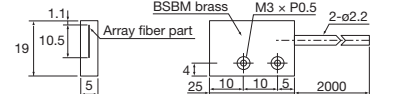
Light is emitted at an approx. 60° angle.

Screen / Array fiber units (through-beam type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Min. bending radius (mm)	Model
		D3RF	D2RF	BRF			
Through-beam type	11 mm wide screen, Flexible, Side ON, Free cut 	7-EL 3,700 6-UL 3,000 5-PL 3,000 4-LG 3,000 3-ST 2,500 2-FS 2,000 1-HS 1,500	Long 3,500 Std 2,500 Fast 1,800	2,500	-40 to +70°C	R10	NF-TZ10 Renewal Collimated light
	11 mm wide screen, Flexible, Side ON, Free cut 	7-EL 3,700 6-UL 3,000 5-PL 3,000 4-LG 3,000 3-ST 2,500 2-FS 2,000 1-HS 1,000	Long 3,000 Std 2,500 Fast 1,200	2,000	-40 to +55°C	R1	NF-TZ09 Renewal Collimated light
	32 mm wide screen, Flexible, Side ON, Free cut 	7-EL 3,700 6-UL 3,700 5-PL 3,700 4-LG 3,700 3-ST 3,700 2-FS 3,000 1-HS 2,500	Long 3,700 Std 3,000 Fast 2,500	2,500	-40 to +60°C	R10	NF-TZ08 Renewal Collimated light

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Screen / Array fiber units (through-beam type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Min. bending radius (mm)	Model	
		D3RF	D2RF	BRF				
Through-beam type	32 mm wide screen, Flexible, Side ON, Free cut 	7-EL 3,700 6-UL 3,700 5-PL 3,700 4-LG 3,700 3-ST 3,700 2-FS 3,000 1-HS 2,500	Long 3,700 Std 3,000 Fast 2,500	2,500	-40 to +55°C	R1	NF-TZ07 Renewal Collimated light	
	40 mm wide screen, Flexible, Side ON, Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,600 3-ST 3,600 2-FS 3,600 1-HS 2,500	Long 3,600 Std 3,600 Fast 3,000	3,600	-40 to +60°C	R2	NF-TS40 Collimated light	
	5.25 mm wide array, Head ON, Free cut 	7-EL 1,350 6-UL 1,260 5-PL 1,170 4-LG 990 3-ST 660 2-FS 400 1-HS 130	Long 650 Std 400 Fast 250	300	-40 to +70°C	R25	NF-TZ05	
	5.25 mm wide array, Side ON, Free cut 	7-EL 1,440 6-UL 1,350 5-PL 1,170 4-LG 1,080 3-ST 710 2-FS 430 1-HS 130	Long 650 Std 400 Fast 250	300	-40 to +70°C	R25	NF-TZ06	
	5.25 mm wide array, Head ON, Free cut 	7-EL 4,000 6-UL 1,600 5-PL 1,000 4-LG 900	3-ST 650 2-FS 330 1-HS 100	Long 800 Std 500 Fast 250	330	-40 to +70°C	R25	NF-TS10
	10.5 mm wide array, Head ON, Free cut 	7-EL 4,000 6-UL 1,600 5-PL 1,000 4-LG 900	3-ST 650 2-FS 330 1-HS 100	Long 800 Std 500 Fast 250	330	-40 to +70°C	R25	NF-TS14

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Screen / Array fiber units (through-beam type/diffuse type)

Photoelectric Sensors

Photoelectric Sensors

Specialized Photoelectric Sensors

Laser Displacement Sensors

Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

Retro-reflective

Small object

Screen/Array

Limited diffuse

Narrow view/

Water mapping

Chemical

Resistant
Vacuum

Resistant

water detection

through-beam type

Correct use

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Min. bending radius (mm)	Model
		D3RF	D2RF	BRF			
Through-beam type	13 mm wide array, Head ON, Free cut 	7-EL 4,000 6-UL 1,500 5-PL 1,400 4-LG 1,200 3-ST 800 2-FS 400 1-HS 100	Long 850 Std 500 Fast 250	350	-40 to +70°C	R25	NF-TS28
	30 mm wide array, Head ON, Free cut 	7-EL 4,000 6-UL 1,400 5-PL 1,200 4-LG 1,000 3-ST 700 2-FS 300 1-HS 100	Long 650 Std 500 Fast 250	200	-40 to +70°C	R25	NF-TS19
Diffuse type	Screen Head ON, Free cut 	7-EL 620 6-UL 580 5-PL 500 4-LG 440	3-ST 280 2-FS 210 1-HS 59	Long 350 Std 250 Fast 100	Unusable	-40 to +60°C	R25 NF-DZ01 Collimated light
	Array, Head ON, Free cut 	7-EL 600 6-UL 560 5-PL 490 4-LG 430	3-ST 270 2-FS 270 1-HS 51	Long 320 Std 170 Fast 85	130	-40 to +70°C	R25 NF-DZ02
	Array, Side ON, Free cut 	7-EL 530 6-UL 500 5-PL 440 4-LG 370	3-ST 250 2-FS 140 1-HS 45	Long 320 Std 170 Fast 85	100	-40 to +70°C	R25 NF-DZ03
	Array, Head ON, Free cut 	7-EL 950 6-UL 500 5-PL 450 4-LG 400	3-ST 250 2-FS 100 1-HS 40	Long 300 Std 180 Fast 80	35	-40 to +70°C	R25 FD-ML02

●The sensing distances for the diffuse type fiber units are values on 500 × 500 mm white paper.

- Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

12

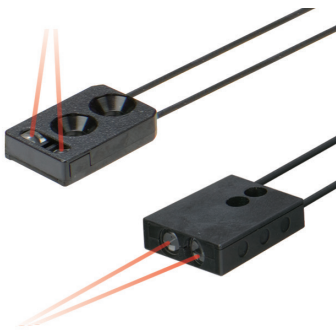
Limited diffuse reflective type

Related
products

Fiber amplifier

D3RF
P.110

Fiber amplifier

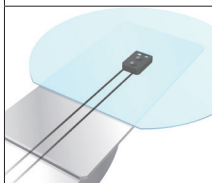


BRF
P.130

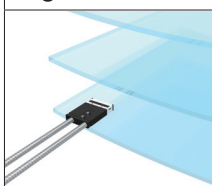



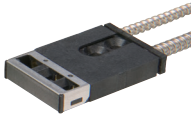

Detection at a limited distance for mapping and alignment

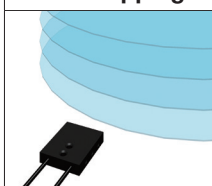

Most number of models in the industry with 14 total models

Detects glass substrate

Five types for detecting existence, five types for alignment, and one for mapping are available, making for a total of 11. Selection is possible between flexible types, heat resistant types, and vacuum resistant types.

Existence detection	NF-DC38	NF-DC07	NF-DH08	NF-DH06
	Low cost 	Standard 	Heat resistant to 180°C 	Heat resistant to 300°C 

Alignment	NF-DC05	NF-DC06	NF-DC04	NF-DH10	NF-DH11
	Standard  Also supports PCB deflection	Flexible  Also supports PCB deflection	Flexible  For long range alignment	Heat resistant to 250°C  Also supports PCB deflection	Long range, heat resistant to 250°C  Also supports PCB deflection

Wafer mapping	NF-DC03
	Standard  Also detects glass substrate of 0.5 mm in thickness

For mapping with through-beam type and retro-reflective type fibers→P.74

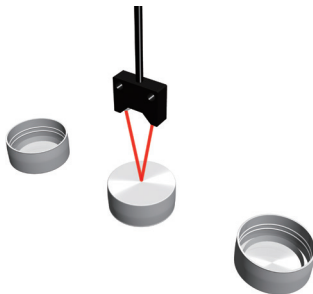
General-purpose use

Three general-purpose models are available

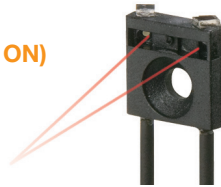
NF-DC09
(Head ON)



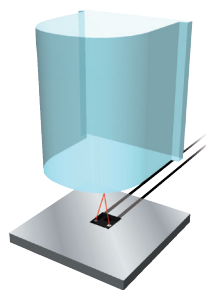
Cap orientation detection



NF-DC08
(Small Flat ON)



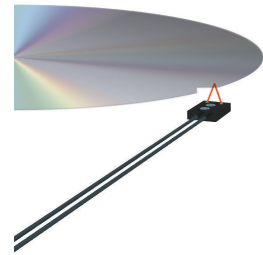
Hoop existence detection



NF-DC39
(Flat ON)



Wafer notch detection



Limited diffuse reflective type fiber units (glass substrate detection)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Min. bending radius (mm)	Model
		D3RF	D2RF	BRF			
Glass substrate detection	Flat ON Alignment, Free cut 	7-EL 3 to 44 6-UL 4 to 39 5-PL 4 to 38 4-LG 4 to 37 3-ST 4 to 35 2-FS 6 to 29 1-HS 9 to 18	Long 7 to 32 Std 10 to 25 Fast 10 to 18	15	0 to +70°C	R25	NF-DC05
	Alignment, Flexible, Free cut 	7-EL 0 to 23 6-UL 0 to 23 5-PL 0 to 22 4-LG 0 to 22 3-ST 0 to 21 2-FS 0 to 20 1-HS 5 to 13	Long 0 to 23 Std 0 to 17 Fast 0 to 12	15	0 to +70°C	R4	NF-DC06
	Alignment, Flexible, Free cut 	7-EL 0 to 38 6-UL 0 to 38 5-PL 0 to 38 4-LG 0 to 38 3-ST 0 to 34 2-FS 0 to 31 1-HS 4 to 22	Long 0 to 36 Std 0 to 30 Fast 0 to 15	Unusable	0 to +70°C	R4	NF-DC04

●Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Limited diffuse reflective type fiber units (glass substrate detection)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Min. bending radius (mm)	Model
		D3RF	D2RF	BRF			
Photoelectric Sensors	Alignment, Heat resistant to 250°C 	7-EL 2 to 28 6-UL 2 to 24 5-PL 2 to 23 4-LG 3 to 23 3-ST 3 to 20 2-FS 3 to 18 1-HS 4 to 11	Long 4 to 20 Std 4 to 20 Fast 4 to 15	4 to 17	-20 to +250°C (Normal temperature side: -20 to +70°C)	R25	NF-DH10
	Alignment, Heat resistant to 250°C 	7-EL 2 to 45 6-UL 3 to 40 5-PL 3 to 39 4-LG 3 to 38 3-ST 4 to 35 2-FS 6 to 28 1-HS 8 to 19	Long 6 to 38 Std 7 to 30 Fast 8 to 25	8 to 25	-20 to +250°C (Normal temperature side: -20 to +70°C)	R25	NF-DH11
	Existence detection, Free cut 	7-EL 0 to 12 6-UL 0.5 to 11 5-PL 1.5 to 10 4-LG 1.5 to 10	3-ST 2.5 to 8 3.5 to 7.5 1-HS 4.5 to 6	Long 2 to 9 Std 4 to 8 Fast 5 to 6	3.5 to 7	-40 to +60°C	R10 NF-DC38 Low cost
	Existence detection, Free cut 	7-EL 3 to 16 6-UL 3 to 14 5-PL 4 to 14 4-LG 5 to 14 3-ST 5 to 13 2-FS 5 to 11 1-HS 7 to 8	Long 4 to 15 Std 5 to 12 Fast 7 to 10	7	-40 to +60°C	R10	NF-DC07
	Existence detection, Heat resistant to 180°C, Free cut 	7-EL 0 to 35 6-UL 0 to 28 5-PL 0 to 25 4-LG 0 to 22 3-ST 0 to 20 2-FS 0 to 9 1-HS 3 to 4	Long 0 to 20 Std 0 to 10 Fast 0 to 8	10	-60 to +180°C	R25	NF-DH08
	Existence detection, Heat resistant to 300°C 	7-EL 0 to 40 6-UL 0 to 34 5-PL 0 to 22 4-LG 0 to 18 3-ST 0 to 17 2-FS 0 to 9 1-HS 0 to 4	Long 0 to 15 Std 0 to 10 Fast 0 to 8	6	-30 to +300°C or -60 to +200°C	R25	NF-DH06

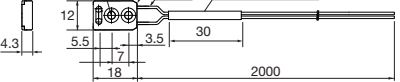
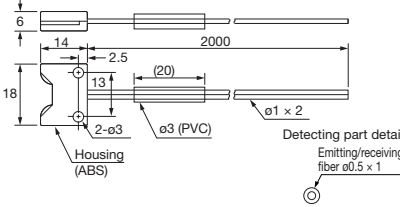
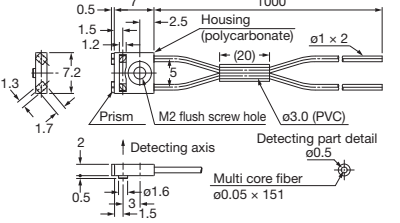
● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Limited diffuse reflective type fiber units (glass substrate detection)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Min. bending radius (mm)	Model
		D3RF	D2RF	BRF			
Glass substrate detection	Mapping, Free cut 	7-EL 2 to 310 6-UL 3 to 160 5-PL 4 to 130 4-LG 5 to 120 3-ST 5 to 110 2-FS 10 to 95 1-HS 12 to 60	Long 10 to 55 Std 10 to 45 Fast 13 to 35	55	-40 to +60°C	R25	NF-DC03

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Limited diffuse reflective fiber units (general-purpose)

Type		Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Min. bending radius (mm)	Model
			D3RF	D2RF	BRF			
General-purpose	Flat ON	<p>Free cut</p> 	<div><div>7-EL 1.5 to 4 6-UL 0 to 4 5-PL 0 to 4 4-LG 0 to 4</div><div>3-ST 0 to 4 2-FS 0 to 4 1-HS 0 to 4</div></div>	<div>Long 0 to 4 Std 0 to 4 Fast 0 to 4</div>	0 to 4	-40 to +60°C	R10	<div>NF-DC39</div> <div>Low cost</div>
	Head ON	<p>Free cut</p> 	<div><div>7-EL 0 to 15 6-UL 5 to 12 5-PL 5 to 11 4-LG 6 to 11 3-ST 6 to 10 2-FS 7 to 9 1-HS 6 to 7</div><div>Long 4.5 to 11 Std 4.5 to 10 Fast 4.5 to 10</div></div>	<div>Long 4.5 to 11 Std 4.5 to 10 Fast 4.5 to 10</div>	6	-40 to +70°C	R10	<div>NF-DC09</div>
	Flat ON	<p>Ultra-small, Flexible, Free cut</p> 	<div><div>7-EL 0 to 9 6-UL 0 to 8 5-PL 0 to 7 4-LG 0 to 6 3-ST 2 to 5 2-FS 2 to 3 1-HS 1 to 2</div><div>Long 1 to 7 Std 1 to 5.5 Fast 1 to 3</div></div>	<div>Long 1 to 7 Std 1 to 5.5 Fast 1 to 3</div>	3	-20 to +60°C	R1	<div>NF-DC08</div>

● The sensing distances for the diffuse type fiber units are values on 500 × 500 mm white paper.

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

13

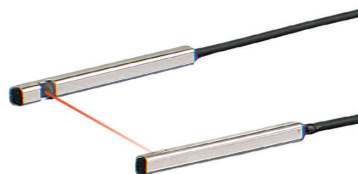
Narrow view/wafer mapping

Related
products

Fiber amplifier

D3RF
P.110

Fiber amplifier

BRF
P.130

Featuring a built-in lens and narrow aperture that minimizes light leakage.

- Long range detection together with minimized light leakage
- Retro-reflective type and diffuse type also available for wafer mapping

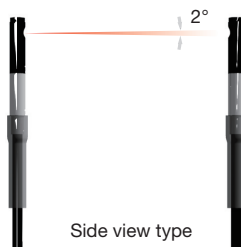
Ultra-narrow view and ultra-thin type

Aperture 2° or less

Ultra-narrow view

Ultra-narrow view which restricted the spread of light to the limit. Optimal for wafer mapping due to a design that minimizes light leakage.

Straight view: **NF-TG01** Side view: **NF-TG02, NF-TG03**

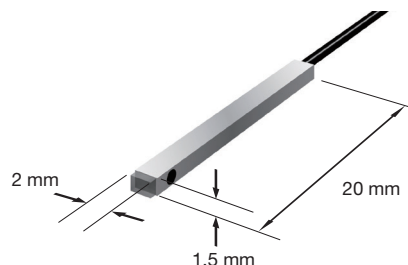


Side view type

Ultra-thin type: **NF-TG04**

Ultra-thin

Ultra-thin design with a thickness of just 1.5 mm. Almost no mounting space needed. Of course, since this is a side view type, the fiber cable can be easily handled.



Retro-reflective types and diffuse types are also available

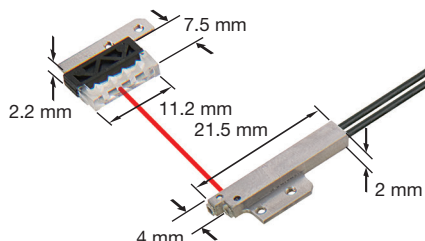
Ultra-thin fiber units and reflectors

Ultra-thin design with a thickness of just 2 mm. Wafer mapping that was only possible on through-beam types which require much cable installation is now possible on retro-reflective types. Of course, since this is a space-saving side view type, the fiber cable can be easily handled.

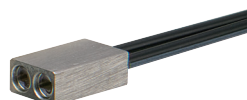
*Reflector thickness is 2.2 mm.

Retro-reflective type **NF-RG01**

Ultra-thin



Diffuse type and limited diffuse reflective type are also available

Diffuse type **NF-DR09**Limited diffuse reflective type
NF-DC03

Narrow view/wafer mapping fiber units (through-beam type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Min. bending radius (mm)	Model
		D3RF	D2RF	BRF			
Through-beam type	2° aperture, Free cut Detecting part (ø2.2) ø3.5 (polycarbonate) ø3.7 (SUS) ø4 (PVC) ø2.2	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,600 3-ST 2,100 2-FS 2,000 1-HS 790	Long 3,000 Std 2,000 Fast 1,300	2,300	-40 to +60°C	R25	NF-TG01 Ultra-narrow view

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Narrow view/wafer mapping fiber units (through-beam type: side view)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Min. bending radius (mm)	Model
		D3RF	D2RF	BRF			
2 × 1.5	3° aperture, Free cut Prism, Light axis, Mounting base surface, SUS, Polycarbonate, Detecting part (ø1)	7-EL 1,000 6-UL 900 5-PL 790 4-LG 690 3-ST 450 2-FS 260 1-HS 90	Long 500 Std 300 Fast 150	220	-40 to +60°C	R10	NF-TG04 Ultra-thin
	2° aperture, Free cut ø4, Light axis, SUS, ø4 (PVC), Polycarbonate, Detecting part (ø2.5)	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,300 3-ST 2,100 2-FS 1,780 1-HS 510	Long 2,500 Std 1,600 Fast 800	900	-40 to +60°C	R25	NF-TG03 Ultra-narrow view
	2° aperture, Flexible, Free cut ø4, Prism, Holder, Tip bracket (SUS), ø4 (PVC), Multi core fiber ø0.075 × 151, Detecting part detail	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,300 3-ST 2,100 2-FS 1,500 1-HS 520	Long 2,500 Std 1,600 Fast 800	1,000	-40 to +60°C	R1	NF-TG02 Ultra-narrow view
	5° aperture, Free cut ø0.75 fiber (1), Mounting bracket (SUS) included, ø2.2, SUS	7-EL 4,000 6-UL 4,000 5-PL 4,000 4-LG 3,000 3-ST 2,800 2-FS 2,000 1-HS 1,000	Long 4,000 Std 3,000 Fast 2,000	1,700	-40 to +70°C	R25	NF-TS12
	3° aperture, Free cut Rod prism (BK7), Lens (BK7), SUS303, ø1	7-EL 4,000 6-UL 4,000 5-PL 4,000 4-LG 1,000 3-ST 2,000 2-FS 1,000 1-HS 300	Long 3,000 Std 1,600 Fast 700	750	-40 to +70°C	R25	NF-TS22

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Type		Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Min. bending radius (mm)	Model
			D3RF	D2RF	BRF			
Retro-reflective type	4 × 2	<p>Wafer mapping, Ultra-small type, Free cut</p> <p>The diagram shows a cross-section of the sensor assembly. Key dimensions include: total width 15.8 mm, mounting part width 14.7 mm, base width 9 mm, and reflector width 11.2 mm. Components labeled include Mounting part (SUS), Base (ABS), Reflector (acrylic), Head block (SUS), Prism, Light axis, Mark band, (Emitting side), (Receiving side), ø3.2 (PVC), and 2-M1.4 x 0.3 threaded. A detecting part detail shows a hole of diameter ø0.5 x 1.</p>	<p>7-EL 590 6-UL 550 5-PL 480 4-LG 420 3-ST 270 2-FS 180 1-HS 70</p>	<p>Long 350 Std 230 Fast 130</p>	Unusable	-40 to +60°C	R10	NF-RG01 Ultra-thin
Diffuse type	Square	<p>Long range detection, Flexible, Free cut</p> <p>The diagram shows two views of the sensor assembly. The top view includes a Glass lens (BK7), Multi core fiber (ø0.075 x 151), Housing (SUS), and ø3.2 (PVC). Dimensions include 15 mm, 2000 mm, 1(20) mm, 5.2 mm, and ø2.2 x 2 mm. A detecting part detail shows a hole of diameter ø1. The bottom view shows the included mounting bracket (SUS) and housing (SUS) with dimensions like 15 mm, 2000 mm, 1(20) mm, 3.3 mm, 4 mm, 12.2 mm, 4 mm, 9.5 mm, 4.6 mm, t1.2 mm, 6 mm, 14 mm, 7 mm, 5.2 mm, and 1.5 mm.</p>	<p>7-EL 1,070 6-UL 990 5-PL 880 4-LG 770 3-ST 500 2-FS 310 1-HS 90</p>	<p>Long 600 Std 380 Fast 200</p>	250	-40 to +60°C	R1	NF-DR09
Limited diffuse reflective type	Square	<p>Possible to detect object even at a thickness of 0.5 mm, Free cut</p> <p>The diagram shows a cross-section of the sensor assembly. Key dimensions include: total width 30 mm, mounting part width 19 mm, base width 6.5 mm, and reflector width 4000 mm. Components labeled include Housing (ABS), Lens, Emitting/receiving fiber (ø1.5 x 1), Detecting part detail, ø2.2 x 2, ø3.2 Model name tube (PVC), 2 - ø3.2 mounting hole, ø5.7 countersinking depth 2.6, 3 - ø3.2 set screw mounting hole (depth 0.5, both sides), and 7.5 mm. A detecting part detail shows a hole of diameter ø1.5 x 1.</p>	<p>7-EL 2 to 310 6-UL 3 to 160 5-PL 4 to 130 4-LG 5 to 120 3-ST 5 to 110 2-FS 10 to 95 1-HS 12 to 60</p>	<p>Long 10 to 55 Std 10 to 45 Fast 13 to 35</p>	55	-40 to +60°C	R25	NF-DC03

●The sensing distances for the diffuse type fiber units are values on 500 × 500 mm white paper.

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

14

Heat resistant (130°C or below)

Related products

Fiber units
Heat resistant
(180 to 200°C)
● P.80Fiber units
Heat resistant
(250 to 350°C)
● P.85

Fiber units for ambient temperatures of 130°C or below

This heat resistant series offers most models in the industry at 30 models (according to in-house survey)

Non-protruding cables Space-saving

Because the cables of NF25-DH and NF25-TH heat resistant nut type fiber units do not protrude even when mounted to the conveyor side, no extra space is needed. Also, they eliminate worries regarding cable breakage caused by snagging on tools during work.

Straight type Extra space needed



Nut type Non-protruding cables



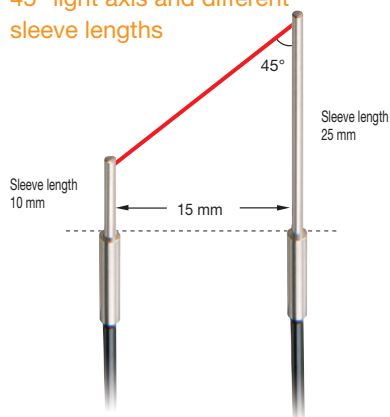
Low cost nut type→P.35
Flexible R2 mm nut type→P.58

Fiber units with 45° angle light axis and different sleeve lengths

An angled light axis is needed when mounting workpieces for detecting transparent glass substrates with through-beam type fibers. The light axis of the NF-TH06 is angled at 45° and the sleeve lengths for the emitting and receiving fibers differ, making it possible to simplify the mounting jig and installation.

NF-TH06

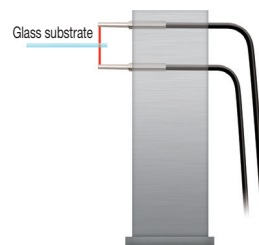
45° light axis and different sleeve lengths



Angle detection using conventional fiber units

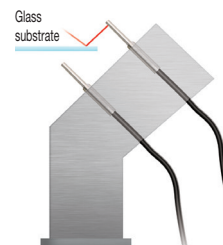
Vertical mounting

The light passes through the glass and detection is unstable when installed vertically to a glass substrate.

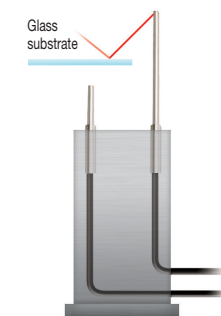


Angled mounting

Although the detection is stable, mounting bracket with a complex shape is needed when mounting at an angle.



NF-TH06 provides stable detection and simple mounting



Photoelectric Sensors

Photoelectric Sensors

Specialized Photoelectric Sensors

Laser Displacement Sensors

Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

Retro-reflective

Small object detection

Screen/Array

Limited diffuse

Narrow view/wafer mapping

Heat resistant

Chemical resistant

Vacuum resistant

Liquid level/liquid leakage/water detection

Lens for through-beam type

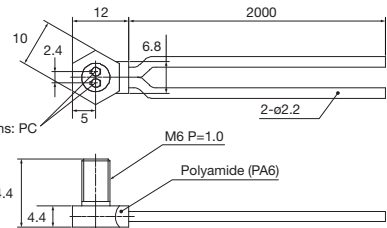
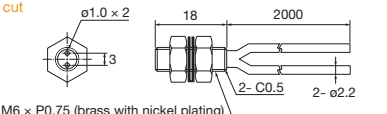
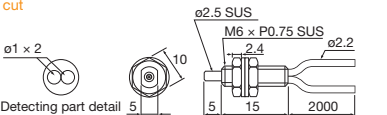
Correct use

Heat resistant <130°C or below> fiber units (through-beam type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Min. bending radius (mm)	Model	
		D3RF	D2RF	BRF				
Through-beam type	<p>Nut type, Free cut</p> <p>Lens: PC</p>	7-EL 2,000 6-UL 1,100 5-PL 1,000 4-LG 900 3-ST 600 2-FS 300 1-HS 90	Long 750 Std 500 Fast 170	300	-40 to +105°C	R25	NF25-TH Space-saving	
	<p>Side view, Free cut</p> <p>Detecting part detail</p>	7-EL 3,500 6-UL 2,300 5-PL 2,000 4-LG 1,800	3-ST 1,200 2-FS 600 1-HS 170	Long 1,300 Std 700 Fast 400	500	-40 to +105°C	R10	NF-TS22M
	<p>ø1 sleeve: 25 mm long and 10 mm long, 45° angle light axis, Heat resistant, Free cut</p> <p>Chamfering 45°</p> <p>Light axis angle</p>	7-EL 100 6-UL 55 5-PL 50 4-LG 40 3-ST 30 2-FS 10 1-HS 4	Long 28 Std 20 Fast 15	16	-40 to +105°C	R10	NF-TH06	
100°C	<p>Lens attachable (P98), Free cut</p> <p>ø1 fiber (1)</p> <p>M2.6 x P0.45</p> <p>M4 x P0.7 (brass with nickel plating)</p>	7-EL 2,400 6-UL 1,400 5-PL 1,000 4-LG 900	3-ST 700 2-FS 300 1-HS 100	Long 700 Std 400 Fast 200	300	-40 to +100°C (Note)	R25	NF-TH01 Low cost

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.
Note: Light intensity retention rate of 90% or above after 2000 continuous work hours.

Heat resistant <130°C or below> fiber units (diffuse type)

Type		Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Min. bending radius (mm)	Model	
			D3RF	D2RF	BRF				
Diffuse type	105°C	<p>Free cut</p> 	7-EL 650 6-UL 350 5-PL 280 4-LG 240 3-ST 175 2-FS 100 1-HS 25	Long 120 Std 80 Fast 25	15	-40 to +105°C	R25	NF25-DH Space-saving	
		<p>Free cut</p> 	7-EL 950 6-UL 500 5-PL 450 4-LG 400	3-ST 250 2-FS 130 1-HS 40	Long 300 Std 180 Fast 80	160	-40 to +105°C	R25	FD-3SD1(100) Standard item
	100°C	<p>Free cut</p> 	7-EL 850 6-UL 550 5-PL 450 4-LG 375	3-ST 275 2-FS 170 1-HS 55	Long 250 Std 150 Fast 50	110	-40 to +100°C (Note)	R25	NF-DH02 Low cost

●The sensing distances for the diffuse type fiber units are values on 500 × 500 mm white paper (1000 × 1000 mm white paper for NF25-DH).
●Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.
Note: Light intensity retention rate of 85% or above after 1000 continuous work hours.

Heat resistant reflector

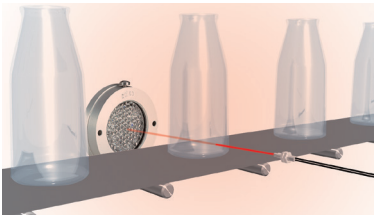
Possible to detect as retro-reflective type if the SW50 heat resistant reflector is used for the heat resistant diffuse type fiber. Demonstrates its strength in transparent object detection under high temperatures.

Reflector heat resistant to 300°C



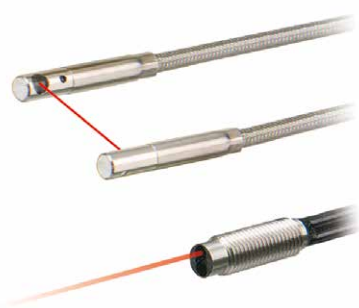
SW50
ø80 × 20 mm (ø50 mm reflective surface)

Glass bottle detection under high temperatures



15

Heat resistant (180 to 200°C)

Related
productsFiber units
Heat resistant
(130°C or below)
● P.77Fiber units
Heat resistant
(250 to 350°C)
● P.85

Fiber units for ambient temperatures of 180 to 200°C

| New concept joint type also available

| This heat resistant series offers the most models in the industry at 30 models (according to in-house survey)

Various selection

Selection is possible from among 13 types of fiber units for ambient temperatures of 180 to 200°C. A wide variation of through-beam types is available to fix customer's applications, including standard and joint types, as well as straight view and side view types.

Through-beam type (standard types)

Straight view			Side view	
NF-TH10	NF-TH11	NF-TH02	NF-TH04S-27V2	NF-TH05S-A
Heat resistant to 200°C	Heat resistant to 200°C	Heat resistant to 180°C	Heat resistant to 200°C	Heat resistant to 200°C
Lens attachable	Lens attachable	Free cut	ø1 sleeve	ø1.5 sleeve

Through-beam type (joint types)

Straight view			Side view	
NF-TH12	NF-TH13	NF-TH14	NF-TH15	NF-TH16
Heat resistant to 200°C	Heat resistant to 200°C	Heat resistant to 200°C	Heat resistant to 200°C	Heat resistant to 200°C
Ordinary temperature fiber section is free cut	Ordinary temperature fiber section is free cut	Ordinary temperature fiber section is free cut	Ordinary temperature fiber section is free cut	Ordinary temperature fiber section is free cut

Diffuse type

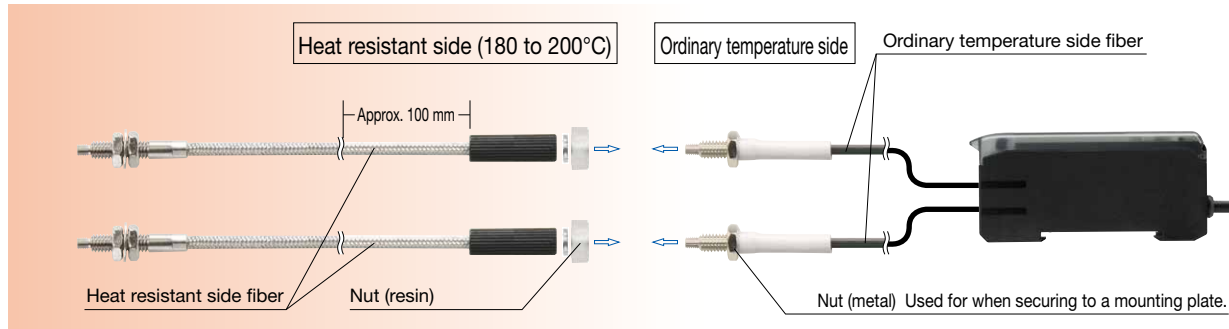
Coaxial	Standard
NF-DH07	NF-DH01
Heat resistant to 200°C	Heat resistant to 200°C
Metal sheath	Free cut

Limited diffuse reflective type

Glass substrate detection
NF-DH08
Heat resistant to 180°C
Free cut

New concept joint type

By using joints for the free cut ordinary temperature fiber and heat resistant fiber, it is easy to attach/remove the fibers, and makes it possible to adjust the fiber length.



Heat resistant <180 to 200°C or below> fiber units (through-beam type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Through-beam type	<p>Lens attachable (P98)</p>	7-EL 570 6-UL 540 5-PL 460 4-LG 410 3-ST 270 2-FS 160 1-HS 45	Long 350 Std 180 Fast 85	110	-60 to +200°C	R10	NF-TH10
	<p>Lens attachable (P98)</p>	7-EL 1,350 6-UL 1,260 5-PL 1,130 4-LG 990 3-ST 630 2-FS 360 1-HS 110	Long 750 Std 450 Fast 220	280	-60 to +200°C	R25	NF-TH11 Standard item
	<p>Lens attachable (P98), Heat resistant side: 200 mm long Only the ordinary temperature side is free cut</p>	7-EL 1,080 6-UL 990 5-PL 900 4-LG 790 3-ST 510 2-FS 290 1-HS 90	Long 550 Std 350 Fast 170	220	-60 to +200°C	Heat resistant side R18 Ordinary temperature side R25	NF-TH12

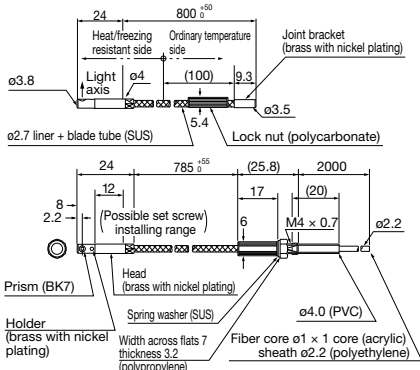
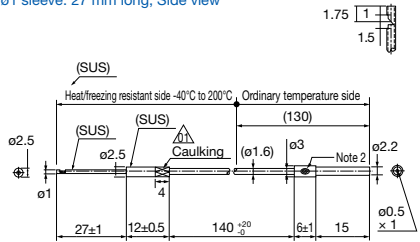
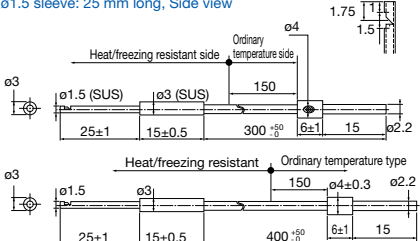
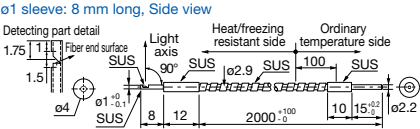
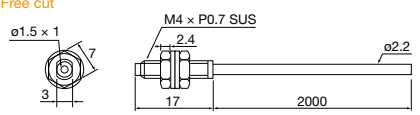
● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Heat resistant <180 to 200°C or below> fiber units (through-beam type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Through-beam type	<p>Heat resistant side: 300 mm long, Only the ordinary temperature side is free cut</p> <p>Heat resistant side: 500 mm long, Only the ordinary temperature side is free cut</p> <p>Side-view, Heat resistant side: 500 mm long, Only the ordinary temperature side is free cut</p>	<p>7-EL 1,080 6-UL 990 5-PL 900 4-LG 790 3-ST 510 2-FS 290 1-HS 90</p>	<p>Long 550 Std 350 Fast 170</p>	<p>220</p>	-60 to +200°C	Heat resistant side R18 Ordinary temperature side R25	NF-TH13
	<p>Heat resistant side: 500 mm long, Only the ordinary temperature side is free cut</p> <p>Side-view, Heat resistant side: 500 mm long, Only the ordinary temperature side is free cut</p>	<p>7-EL 1,080 6-UL 990 5-PL 900 4-LG 790 3-ST 510 2-FS 290 1-HS 90</p>	<p>Long 550 Std 350 Fast 170</p>	<p>220</p>	-60 to +200°C	Heat resistant side R18 Ordinary temperature side R25	NF-TH14
	<p>Side-view, Heat resistant side: 500 mm long, Only the ordinary temperature side is free cut</p> <p>Side-view, Heat resistant side: 500 mm long, Only the ordinary temperature side is free cut</p>	<p>7-EL 900 6-UL 870 5-PL 760 4-LG 660 3-ST 430 2-FS 260 1-HS 80</p>	<p>Long 500 Std 300 Fast 150</p>	<p>150</p>	-60 to +200°C	Heat resistant side R18 Ordinary temperature side R25	NF-TH15

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Heat resistant <180 to 200°C or below> fiber units (through-beam type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model	
		D3RF	D2RF	BRF				
Through-beam type	<p>Side-view, Heat resistant side: 800 mm long, Only the ordinary temperature side is free cut.</p>  <p>Heat/freezing resistant side Ordinary temperature side Joint bracket (brass with nickel plating) Light axis Lock nut (polycarbonate) Prism (BK7) Holder (brass with nickel plating) Fiber core $\phi 1 \times 1$ core (acrylic) sheath $\phi 2.2$ (polyethylene)</p>	<p>7-EL 900 6-UL 870 5-PL 760 4-LG 660 3-ST 430 2-FS 260 1-HS 80</p>	<p>Long 500 Std 300 Fast 150</p>	150	-60 to +200°C	Heat resistant side R18 Ordinary temperature side R25	NF-TH16	
	<p>$\phi 1$ sleeve: 27 mm long, Side view</p>  <p>(SUS) Heat/freezing resistant side -40°C to 200°C Ordinary temperature side Caulking Note 2</p>	<p>7-EL 450 6-UL 260 5-PL 240 4-LG 200 3-ST 140 2-FS 70 1-HS 20</p>	<p>Long 120 Std 80 Fast 50</p>	50	-40 to +200°C	R30	NF-TH04S-27V2 Made-to-order products	
	<p>$\phi 1.5$ sleeve: 25 mm long, Side view</p>  <p>Heat/freezing resistant side Ordinary temperature side Heat/freezing resistant Ordinary temperature type</p>	<p>7-EL 1,600 6-UL 850 5-PL 800 4-LG 600 3-ST 400 2-FS 200 1-HS 60</p>	<p>Long 350 Std 250 Fast 150</p>	150	-40 to +200°C	R30	NF-TH05S-A Made-to-order products	
	<p>$\phi 1$ sleeve: 8 mm long, Side view</p> <p>Detecting part detail</p>  <p>Fiber end surface Light axis Heat/freezing resistant side Ordinary temperature side</p>	<p>7-EL 300 6-UL 160 5-PL 150 4-LG 100</p>	<p>3-ST 90 2-FS 40 1-HS 14 Fast 30</p>	50	-40 to +200°C	R50	NF-TH07	
180°C	<p>Free cut</p>  <p>$\phi 1.5 \times 1$ M4 \times P0.7 SUS 2.4 17 2000 $\phi 2.2$</p>	<p>7-EL 4,000 6-UL 2,200 5-PL 1,700 4-LG 1,500</p>	<p>3-ST 1,000 2-FS 550 1-HS 180</p>	<p>Long 1,000 Std 700 Fast 350</p>	600	-40 to +180°C (Note)	R35 Standard item	NF-TH02

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.
Note: Light intensity retention rate of 85% or above after 1000 continuous work hours.

Photoelectric Sensors

Photoelectric Sensors

Specialized Photoelectric Sensors

Laser Displacement Sensors

Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

Retro-reflective

Small object detection

Screen/Array

Limited diffuse

Narrow view/
wafer mapping

Heat resistant

Chemical resistant

Vacuum
resistant

Liquid level/liquid leakage/
water detection

Lens for
through-beam type

Correct use

Heat resistant <180 to 200°C or below> fiber units (diffuse type)

Type		Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
			D3RF	D2RF	BRF			
Diffuse type	200°C	<p>Coaxial, Metal sheath</p> <p>27 1000 60 35 30 16.7 18.3 20 5</p>						

- The sensing distances for the diffuse type fiber units are values on 500 × 500 mm white paper.
●Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.
Note: Light intensity retention rate of 85% or above after 1000 continuous work hours.

Heat resistant <180 to 200°C or below> fiber units (limited diffuse reflective type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Limited diffuse reflective type	<p>180°C</p> <p>Glass substrate detection, Free cut</p> <p>Detecting part detail</p> <p>Emitting/receiving fiber $\phi 1.5 \times 1$</p>	<p>7-EL 0 to 35</p> <p>6-UL 0 to 28</p> <p>5-PL 0 to 25</p> <p>4-LG 0 to 22</p> <p>3-ST 0 to 20</p> <p>2-FS 0 to 9</p> <p>1-HS 3 to 4</p>	<p>Long 0 to 20</p> <p>Std 0 to 10</p> <p>Fast 0 to 8</p>	10	-60 to +180°C	R25	NF-DH08

- Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.
Note: Light intensity retention rate of 85% or above after 1000 continuous work hours.

Heat resistant reflector

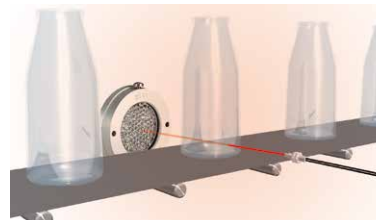
Possible to detect as retro-reflective type if the [SW50](#) heat resistant reflector is used for the heat resistant diffuse type fiber.
Demonstrates its strength in transparent object detection under high temperatures.

Reflector heat resistant to 300°C



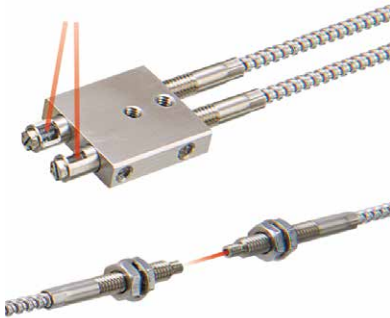
SW50
ø80 x 20 mm (ø50 mm reflective surface)

Glass bottle detection under high temperatures



16

Heat resistant (250 to 350°C)

Related
productsFiber units
Heat resistant
(130°C or below)
● P.77Fiber units
Heat resistant
(180 to 200°C)
● P.80

Fiber units for ambient temperatures of 250 to 350°C


▮ Limited diffuse reflective types are optimal for glass substrate alignment

▮ This heat resistant series offers the most models in the industry at 30 models (according to in-house survey)



Through-beam type/Diffuse type/Limited diffuse reflective type

Two through-beam types, three diffuse types, and three limited diffuse reflective types are available. We offer a total of 8 variations to suit any high-temperature application.


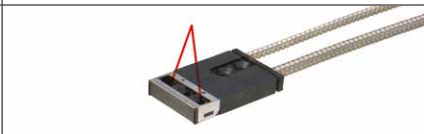
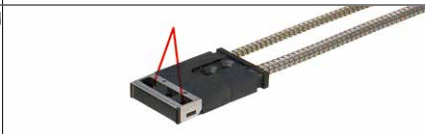
Through-beam type

Standard	60 mm sleeve
NF-TH08	NF-TH09
	

Diffuse type

Coaxial	60 mm sleeve	90 mm sleeve
NF-DH03	NF-DH04	NF-DH05
		

Limited diffuse reflective type

Glass substrate detection	Glass substrate alignment	
NF-DH06	NF-DH10	NF-DH11
		

Photoelectric
SensorsPhotoelectric
SensorsSpecialized
Photoelectric
SensorsLaser
Displacement
Sensors

Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

Retro-reflective

Small object
detection

Screen/Array

Limited diffuse

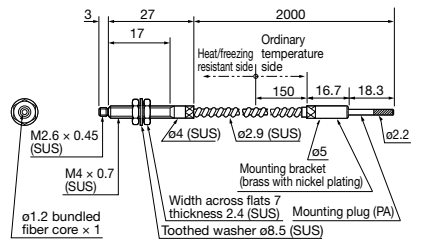
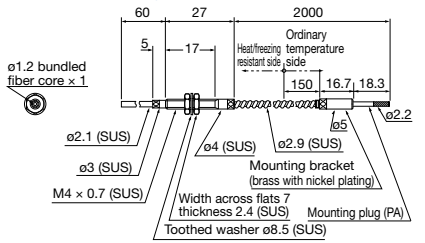
Narrow view/
wafer mapping

Heat resistant

Chemical
resistantVacuum
resistantLiquid level/liquid leakage/
water detectionLens for
through-beam type

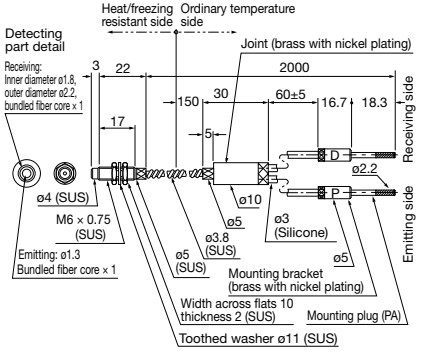
Correct use

Heat resistant <250 to 350°C or below> fiber units (through-beam type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Through-beam type	350°C 	7-EL 1,440 6-UL 1,350 5-PL 1,240 4-LG 1,080 3-ST 710 2-FS 430 1-HS 130	Long 750 Std 450 Fast 220	300	-30 to +350°C or -60 to +200°C	R25	NF-TH08 Standard item
	ø2.1 sleeve: 60 mm long 	7-EL 1,350 6-UL 1,260 5-PL 1,120 4-LG 900 3-ST 630 2-FS 410 1-HS 120	Long 750 Std 450 Fast 220	300	-30 to +350°C or -60 to +200°C	Fiber R25 Sleeve R10	NF-TH09

●Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Heat resistant <250 to 350°C or below> fiber units (diffuse type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Diffuse type	350°C 	7-EL 940 6-UL 890 5-PL 770 4-LG 670 3-ST 440 2-FS 190 1-HS 50	Long 650 Std 250 Fast 80	150	-30 to +350°C or -60 to +200°C	R25	NF-DH03 Standard item

●The sensing distances for the diffuse type fiber units are values on 500 × 500 mm white paper.

●Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Limited diffuse reflective type	<p>300°C</p> <p>Glass substrate detection Flat ON</p>	<p>7-EL 0 to 40 6-UL 0 to 34 5-PL 0 to 22 4-LG 0 to 18 3-ST 0 to 17 2-FS 0 to 9 1-HS 0 to 4</p>	<p>Long 0 to 15 Std 0 to 10 Fast 0 to 8</p>	6	-30 to +300°C or -60 to +200°C	R25	NF-DH06
	<p>250°C</p> <p>Glass substrate alignment Flat ON</p>	<p>7-EL 2 to 28 6-UL 2 to 24 5-PL 2 to 23 4-LG 3 to 23 3-ST 3 to 20 2-FS 3 to 18 1-HS 4 to 11</p>	<p>Long 4 to 20 Std 4 to 20 Fast 4 to 15</p>	4 to 17	-20 to +250°C (Ordinary temperature side: -20 to +70°C)	R25	NF-DH10
Limited diffuse reflective type	<p>250°C</p> <p>Glass substrate alignment Flat ON</p>	<p>7-EL 2 to 45 6-UL 3 to 40 5-PL 3 to 39 4-LG 3 to 38 3-ST 4 to 35 2-FS 6 to 28 1-HS 8 to 19</p>	<p>Long 6 to 38 Std 7 to 30 Fast 8 to 25</p>	8 to 25	-20 to +250°C (Ordinary temperature side: -20 to +70°C)	R25	NF-DH11

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

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Chemical resistant

Related products

Fiber amplifier

D3RF
 P.110

Fiber amplifier

BRF
 P.130

Photoelectric Sensors

Photoelectric Sensors

Specialized Photoelectric Sensors

Laser Displacement Sensors

Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

Retro-reflective

Small object detection

Screen/Array

Limited diffuse

Narrow view/ wafer mapping

Heat resistant

Chemical resistant

Vacuum resistant

Liquid level/liquid leakage/ water detection

Lens for through-beam type

Correct use

Fiber portion is protected from chemicals and oils using a fluoroplastic coating.

Select an optimal model from among 7 through-beam types and 1 diffuse type

For use with various chemicals

The detecting part and fiber portion are protected from chemicals by using a fluoroplastic coating. Selection of an optimal model is possible from among 7 through-beam types and 1 diffuse type.

Chemical resistance

Chemical resistance		
Chemical type	Typical examples	Resistance
Inorganic acids	Hydrochloric acid, sulfuric acid, nitric acid, phosphoric acid, chromic acid	✓
Organic acids	Acetic acid, oxalic acid, formic acid, oleic acid, phthalic acid	✓
Alkali	Caustic soda, caustic potash, ammonia water, calcium hydroxide	✓
Salts	Sodium chloride, magnesium sulfate, lead nitrate, potassium chlorate	✓
Alcohols	Ethanol, butyl alcohol, glycerol	✓
Glycols		✓
Ketones	Acetone, methyl ethyl ketone	✓
Esters	Butyl acetate, dibutyl, phthalate	✓
Ethers	Ethyl ether, dibutyl ether	✓
Amines	Dibutyl amine, triethanolamine	✓
Aliphatics	Propane, butadiene, cyclohexane, kerosene	✓
Aromatics	Benzene, toluene, xylene, aniline	✓
Organic halogen compounds (chlorine)	Carbon tetrachloride, trichlene, ethylene sulfide	✓

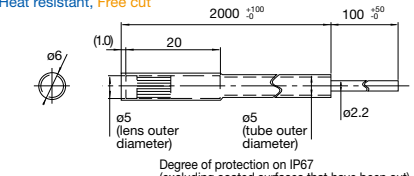
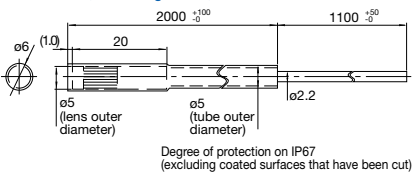
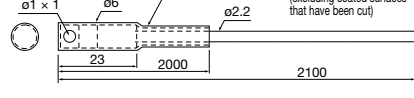
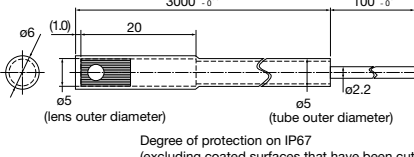
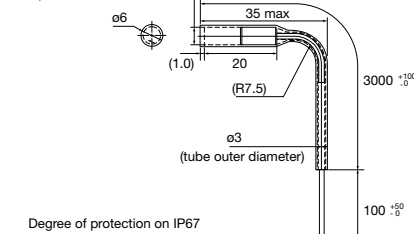
Oil resistance	
Resistance for fire resistant fluids	Resistance
Fire resistant fluid mineral oil	✓
Water-glycolic phosphoric acid	✓
Ester chlorinated hydrocarbons	✓
Diester oil	✓
Silicone ester oil	✓
Low aniline point oils	✓
High aniline point oils	✓

Chemical resistant fiber units (through-beam type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Through-beam type	Square 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,150	3-ST 2,000 2-FS 2,000 1-HS 760	Long 3,500 Std 2,500 Fast 1,300	2,000	0 to +60°C	R25 NF-TY05
	Side ON, Fiber length: 5 m, Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,200	3-ST 2,000 2-FS 1,600 1-HS 550	Long 3,000 Std 2,000 Fast 1,000	1,500	0 to +60°C	R25 NF-TY05-5

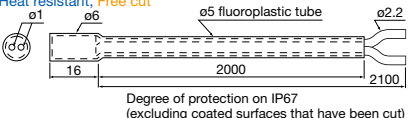
● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Chemical resistant fiber units (through-beam type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Through-beam type	Heat resistant, Free cut 	7-EL 4,000 6-UL 4,000 5-PL 4,000 4-LG 3,000	3-ST 2,800 2-FS 2,000 1-HS 700	Long 3,500 Std 2,500 Fast 1,200	2,000	-40 to +105°C	R60 NF-TY01
	Heat resistant, Fiber length: 3 m, Free cut 	7-EL 4,000 6-UL 4,000 5-PL 4,000 4-LG 3,500	3-ST 3,000 2-FS 1,700 1-HS 500	Long 2,200 Std 1,300 Fast 550	650	-40 to +105°C	R60 NF-TY01-3
	Side view, Free cut 	7-EL 4,000 6-UL 3,500 5-PL 2,800 4-LG 2,000	3-ST 1,500 2-FS 700 1-HS 200	Long 1,500 Std 800 Fast 400	500	-40 to +70°C	R60 NF-TY02
	Side view, Free cut 	7-EL 4,000 6-UL 3,500 5-PL 3,000 4-LG 2,000	3-ST 1,500 2-FS 700 1-HS 200	Long 1,500 Std 800 Fast 400	480	-40 to +70°C	Fiber R25 Tube R60 NF-TY02-TF3
	Elbow, Free cut 	7-EL 4,000 6-UL 4,000 5-PL 3,500 4-LG 3,000 3-ST 2,200 2-FS 1,000 1-HS 300	3-ST 160 2-FS 145 1-HS 85	Long 3,000 Std 1,700 Fast 800	900	-55 to +70°C	Fiber R20 Tube R20 NF-TY03-TF3

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Chemical resistant fiber units (diffuse type)

Type	Features/dimensions (mm)	Sensing distance (mm)			Ambient temperature	Bending radius (mm)	Model
		D3RF	D2RF	BRF			
Diffuse type	Heat resistant, Free cut 	7-EL 440 6-UL 280 5-PL 250 4-LG 225	3-ST 160 2-FS 145 1-HS 85	Long 100 Std 70 Fast 50	45	-40 to +100°C	R60 NF-DY01 Only in industry

● The sensing distances for the diffuse type fiber units are values on 500 × 500 mm white paper.

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

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Liquid level/liquid leakage/water detection

Related
productsFiber amplifier
D3RF
D3IF
P.110Fiber amplifier
BRF
BIF
P.130

Fiber units for detecting liquid

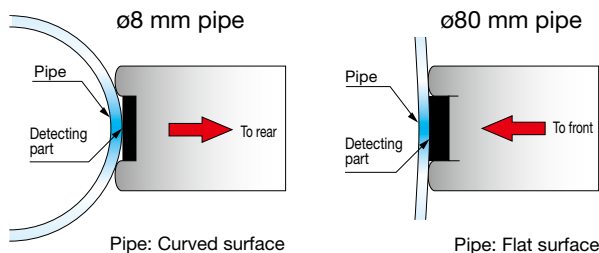
- Select based on applications for liquid level, liquid leakage, and water detection
- Array type NF-DF07 that can be mounted on $\varnothing 8$ to $\varnothing 80$ mm pipes
- A liquid accumulation prevention structure is used for all liquid level contact type models.

Liquid level detection 1: Pipe-mounted type

Array type mountable on $\varnothing 8$ to $\varnothing 80$ mm pipes and tolerant to air bubbles: **NF-DF07**

In order to detect the liquid level without being affected by bubbles or water droplets, the number of cores and the array length of the array type **NF-DF07** have been optimized to 18×8.75 mm. As a result of an optical design that can perform detections without malfunctioning, stable liquid level detection becomes possible.

A detection surface slide structure has been adopted that can bring the detection surface into close contact regardless of the pipe diameter. It can be installed on large diameter pipes up to a maximum of $\varnothing 80$ mm.



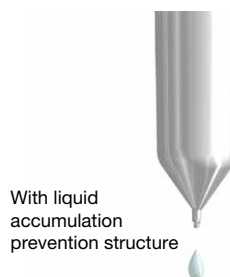
Liquid level detection 2: Liquid level contact type

A liquid accumulation prevention structure is used for all liquid level contact type models.

Multi step tip design prevents accumulation of liquid at the tip of the sensor head. This design is useful for preventing malfunctions.



Without liquid
accumulation
prevention structure



With liquid
accumulation
prevention structure

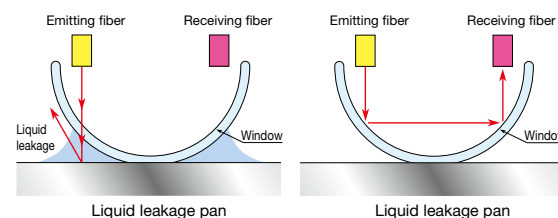
Liquid leakage detection

Detects leakage (liquid leakage) to liquid leakage pan: NF-DW02



Detection theory

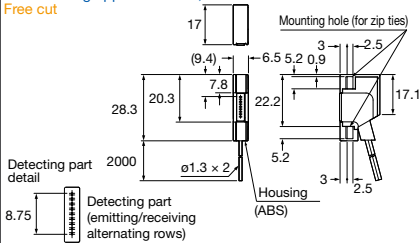
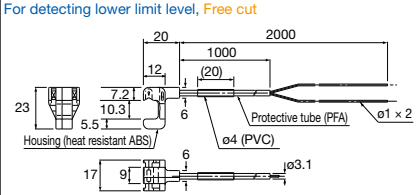
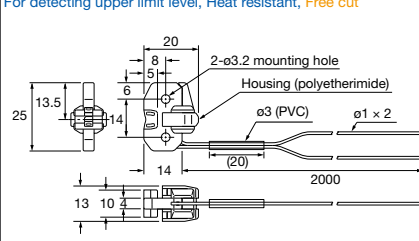
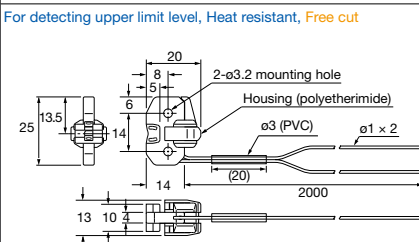
When there is liquid leakage, light from the emitting fiber will be diffused in the liquid leakage causing light to not be detected.



Light from the emitting fiber is reflected by the liquid leakage and not detected by the receiving fiber.

Light from the emitting fiber is reflected by the window and detected by the receiving fiber.

Liquid level detection fiber

Type	Dimensions (unit: mm)	Details	Ambient temperature	Bending radius (mm)	Model
Liquid level detection	Pipe-mounted For detecting upper limit level, Free cut 	For transparent pipes with outer diameter of ø8 mm or more (When used with included zip ties: ø8 to 80 mm) An array type tolerant to air bubbles	-40 to +70°C	R10	NF-DF07
	For detecting lower limit level, Free cut 	For PFA pipes with outer diameter of ø3 to 10 mm and thickness of 0.3 to 1 mm, or pipes with same level of transparency	-20 to +60°C	Protective tube R20 Fiber R4	NF-TF01
	For detecting upper limit level, Heat resistant, Free cut 	For PFA pipes with outer diameter of ø6 to 26 mm and thickness of 1 mm, or pipes with same level of transparency With mounting position adjusting lever	-40 to +100°C	R10	NF-DF05
	For detecting upper limit level, Heat resistant, Free cut 	For transparent pipes with outer diameter of ø6 to 26 mm and thickness of 1 to 3 mm With mounting position adjusting lever	-40 to +100°C	R10	NF-DF04

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Liquid level detection fiber

Type	Dimensions (unit: mm)	Details	Ambient temperature	Bending radius (mm)	Model
Liquid level detection (Liquid level contact type)	<div>Heat resistant, Free cut</div>	Liquid level contact type, liquid accumulation prevention structure Protective tube: Fluoroplastic 500 mm long (can be cut) Heat resistant to +105°C	-40 to +105°C	Protective tube R20 Fiber R10	NF-DF08
	<div>Free cut</div>	Liquid level contact type, liquid accumulation prevention structure Protective tube: Fluoroplastic 2 m long (can be cut)	-40 to +70°C	R60	NF-DF03 Standard item

●Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

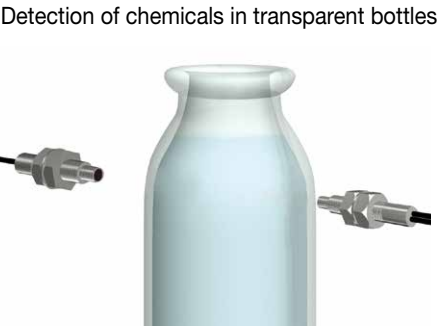
Liquid leakage detection fiber

Type	Dimensions (unit: mm)	Details	Ambient temperature	Bending radius (mm)	Model
Liquid leakage detection	<div>Free cut</div>	SEMI S2 supported Through use of capillary phenomenon can also detect minor liquid leakage and viscous liquid Included mounting brackets can be purchased separately. NF-DA52 (SUS mounting bracket) NF-DA53 (PVC mounting bracket)	-20 to +50°C	Protective tube R20 Fiber R4	NF-DW02

●Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Water detection fiber

Fiber unit specialized for D3IF and BIF fiber amplifiers for detecting water. The detection of contents (through-beam type) or adhesives inside transparent bottles, as well as detection of colorless water or chemicals on the production is now possible.



Water detection fiber units (through-beam type/diffuse type)

Type	Dimensions (unit: mm)	Sensing distance (mm)		Ambient temperature	Bending radius (mm)	Model
		D3IF-TN	BIF			
Through-beam type	<p>Heat resistant</p>	<p>7-EL 650 6-UL 350 5-PL 300 4-LG 250 3-ST 230 2-FS 150 1-HS 60</p>	100	-40 to +200°C	R25	NF-TW01
Diffuse type	<p>Heat resistant</p>	<p>7-EL 280 6-UL 125 5-PL 110 4-LG 100 3-ST 85 2-FS 45 1-HS 20</p>	30	-40 to +200°C	R25	NF-DW01

- Use D3IF-TN or BIF-WN/-CWN fiber amplifiers for water detection
- The sensing distances for the diffuse type fiber units are values on 500 × 500 mm white paper.
- Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

20 Lens for through-beam type

Related
productsLens for small object
detection
NF-DA
P.64Vacuum resistant
Lens for fiber
NF-TA
P.92Lenses for through-beam type fiber
units selectable from 6 models

| Long distance lens for extending sensing distance

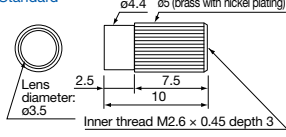
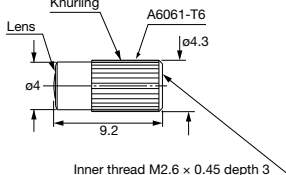
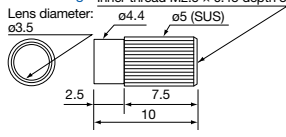
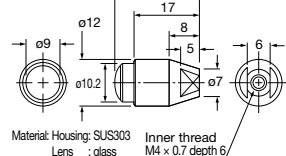
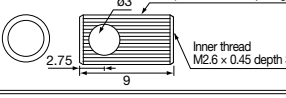
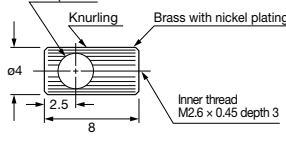
| Side-view lens for space saving

Lens for through-beam type fiber units (fiber amplifier: D3RF)

Type	Dimensions (mm)	Applicable fiber units	D3RF sensing distance (mm)							Ambient temperature	Model
			7-EL	6-UL	5-PL	4-LG	3-ST	2-FS	1-HS		
Long range lens	Standard 	NF-TB01	4,000	4,000	4,000	4,000	4,000	2,500	800	-40 to +100°C	NF-TA01 (2 pieces)
		NF-TB02	4,000	4,000	4,000	4,000	4,000	4,000	1,800		
		NF-TB06	4,000	4,000	4,000	4,000	4,000	4,000	1,500		
		NF-TJ01	2,000	2,000	2,000	2,000	2,000	2,000	750		
		NF-TR01	4,000	4,000	4,000	4,000	4,000	4,000	1,800		
		NF-TK77	4,000	4,000	4,000	4,000	4,000	4,000	2,000		
	Heat resistant 	NF-TB01	4,000	4,000	4,000	4,000	4,000	2,000	360	-40 to +350°C	NF-TA03 (2 pieces) Low cost
		NF-TB02	4,000	4,000	4,000	4,000	4,000	4,000	1,200		
		NF-TB06	4,000	4,000	4,000	4,000	4,000	4,000	1,200		
		NF-TJ01	2,000	2,000	2,000	2,000	2,000	2,000	600		
		NF-TR01	4,000	4,000	4,000	4,000	4,000	2,000	800		
		NF-TK77	4,000	4,000	4,000	4,000	4,000	2,000	600		
	SUS housing 	NF-TB01	4,000	4,000	4,000	4,000	4,000	2,500	800	-40 to +100°C	NF-TA01S (2 pieces)
		NF-TB02	4,000	4,000	4,000	4,000	4,000	4,000	1,800		
		NF-TB06	4,000	4,000	4,000	4,000	4,000	4,000	1,500		
		NF-TJ01	2,000	2,000	2,000	2,000	2,000	2,000	650		
		NF-TR01	4,000	4,000	4,000	4,000	4,000	4,000	1,800		
		NF-TK77	4,000	4,000	4,000	4,000	4,000	4,000	2,000		
Ultra-long range lens	Heat resistant 	NF-TB01	4,000	4,000	4,000	4,000	4,000	4,000	4,000	-60 to +350°C	NF-TA04 (2 pieces)
		NF-TB02	4,000	4,000	4,000	4,000	4,000	4,000	4,000		
		NF-TB06	4,000	4,000	4,000	4,000	4,000	4,000	4,000		
		NF-TJ01	2,000	2,000	2,000	2,000	2,000	2,000	2,000		
		NF-TR01	4,000	4,000	4,000	4,000	4,000	4,000	4,000		
		NF-TK77	4,000	4,000	4,000	4,000	4,000	4,000	4,000		
		NF-TB01	4,000	4,000	4,000	4,000	4,000	4,000	4,000		
		NF-TB02	4,000	4,000	4,000	4,000	4,000	4,000	4,000		
		NF-TB06	4,000	4,000	4,000	4,000	4,000	4,000	4,000		
		NF-TJ01	2,000	2,000	2,000	2,000	2,000	2,000	2,000		
		NF-TR01	4,000	4,000	4,000	4,000	4,000	4,000	4,000		
		NF-TK77	4,000	4,000	4,000	4,000	4,000	4,000	4,000		
Side-view lens	Standard 	NF-TB01	3,600	2,500	2,000	1,600	1,200	650	200	-40 to +70°C	NF-TA02 (2 pieces)
		NF-TB02	4,000	3,500	3,000	2,400	1,800	1,000	300		
		NF-TJ01	2,000	1,900	1,600	1,500	950	600	200		
		NF-TR01	4,000	3,300	2,400	2,000	1,500	900	200		
		NF-TK77	4,000	3,500	3,000	2,400	1,800	950	300		
	Heat resistant 	NF-TB01	4,000	2,400	2,300	2,000	1,200	800	250	-60 to +300°C	NF-TA05 (2 pieces) Low cost
		NF-TB02	4,000	2,400	2,300	2,000	1,200	800	250		
		NF-TJ01	2,000	1,900	1,700	1,500	950	600	200		
		NF-TR01	4,000	1,700	1,600	1,300	850	550	160		
		NF-TK77	4,000	1,900	1,700	1,500	950	600	200		
		NF-TB01	4,000	1,500	1,300	1,200	800	450	160		
		NF-TB02	4,000	1,600	1,500	1,200	800	550	170		
		NF-TJ01	2,000	1,100	1,000	850	600	300	100		
		NF-TK77	4,000	1,400	1,200	1,100	700	400	150		
		NF-TB01	4,000	2,400	2,300	2,000	1,200	800	250		
		NF-TB02	4,000	2,400	2,300	2,000	1,200	800	250		
		NF-TJ01	2,000	1,900	1,700	1,500	950	600	200		

● Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Lens for through-beam type fiber units (fiber amplifier: D2RF, BRF)

Type	Dimensions (mm)	Applicable fiber units	Sensing distance (mm)				Ambient temperature	Model
			D2RF			BRF		
			Long	Std	Fast			
Long range lens	Standard 	NF-TB01	3,500	3,500	1,500	3,000	-40 to +100°C	NF-TA01 (2 pieces)
		NF-TB02	3,500	3,500	1,500	3,500		
		NF-TB06	3,500	3,500	3,500	3,500		
		NF-TJ01	1,500	1,500	1,500	1,500		
		NF-TR01	3,500	3,500	3,000	3,000		
		NF-TK77	3,500	3,500	3,000	3,500		
		NF-TH01	3,500	3,500	2,500	3,500		
	Heat resistant 	NF-TB01	3,500	3,500	600	3,500	-40 to +350°C	NF-TA03 (2 pieces) Low cost
		NF-TB02	3,500	3,500	3,000	3,500		
		NF-TB06	3,500	3,500	2,800	3,500		
		NF-TJ01	1,500	1,500	1,500	1,500		
		NF-TR01	3,500	3,500	2,000	2,500		
		NF-TK77	3,500	3,500	1,700	3,500		
		NF-TH01	3,500	3,500	2,700	3,500		
		NF-TH08	3,500	3,500	1,900	2,100		
		NF-TH10	1,500	1,500	1,500	1,500		
		NF-TH11	1,500	1,500	1,500	1,500		
	SUS housing 	NF-TB01	3,500	3,500	1,500	3,000	-40 to +100°C	NF-TA01S (2 pieces)
		NF-TB02	3,500	3,500	1,500	3,500		
		NF-TB06	3,500	3,500	3,500	3,500		
		NF-TJ01	1,500	1,500	1,500	1,500		
		NF-TR01	3,500	3,500	3,000	3,000		
		NF-TK77	3,500	3,500	3,000	3,500		
		NF-TH01	3,500	3,500	2,500	3,500		
Ultra-long range lens	Heat resistant 	NF-TB01	3,500	3,500	3,500	3,500	-60 to +350°C	NF-TA04 (2 pieces)
		NF-TB02	3,500	3,500	3,500	3,500		
		NF-TB06	3,500	3,500	3,500	3,500		
		NF-TJ01	1,500	1,500	1,500	1,500		
		NF-TR01	3,500	3,500	3,500	3,500		
		NF-TK77	3,500	3,500	3,500	3,500		
		NF-TH01	3,500	3,500	3,500	3,500		
		NF-TH08	3,500	3,500	3,500	3,500		
		NF-TH10	1,500	1,500	1,500	1,500		
		NF-TH11	1,500	1,500	1,500	1,500		
		NF-TH11	1,500	1,500	1,500	1,500		
Side-view lens	Standard 	NF-TB01	1,500	800	400	600	-40 to +70°C	NF-TA02 (2 pieces)
		NF-TB02	1,500	1,000	450	600		
		NF-TJ01	1,500	800	450	500		
		NF-TR01	1,000	700	450	500		
		NF-TK77	1,500	800	450	600		
	Heat resistant 	NF-TB01	1,800	900	400	500	-60 to +300°C	NF-TA05 (2 pieces) Low cost
		NF-TB02	1,800	900	400	500		
		NF-TJ01	1,300	600	300	400		
		NF-TR01	1,100	600	250	350		
		NF-TK77	1,300	600	300	400		
		NF-TH01	1,000	500	250	400		
		NF-TH08	1,100	600	250	350		
		NF-TH10	700	300	180	300		
		NF-TH11	900	500	250	350		

●Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

Photoelectric
Sensors

Photoelectric
Sensors

Specialized
Photoelectric
Sensors

Laser
Displacement
Sensors

Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

Retro-reflective

Small object
detection

Screen/Array

Limited diffuse

Narrow view/
wafer mapping

Heat resistant

Chemical
resistant

Vacuum
resistant

Liquid level/liquid leakage/
water detection

Lens for
through-beam type

Correct use