

### Industry largest selection/ cost effective fiber units

Selection of optimal fiber units and options is possible from among 200 models



### **Selection guide**

#### **Mounting method**



Square type with mounting hole that can be mounted easily.



Type that can be mounted with a threaded nut.



Type that can be mounted with a set screw. Compact and space-saving.



Features a narrow tip that enables highly flexible mounting and is easy to position.



Ideal for detection in narrow spaces thanks to its 90° deflection.

#### Ease of handling



Flexible type that can be mounted to moving parts.



Flexible type that can be bent in 1 mm radius. Also prevents problems caused by catching.



Flexible type that can be bent in 2 mm radius. Nut type is also available.



#### Beam shape/detection type



Optimal for transparent object detection. An ultra-thin type for wafer mapping is also available.



Performs detection when distances are limited. Optimal for alignment or mapping.



Type optimal for detecting small workpieces using a spot lens or superfine fiber.



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



Optimal for when workpiece passage locations are not fixed.

#### Photoelectric Sensors

Specialized Photoelectric Sensors

Laser Displacement Sensors

Fiber Units

Model selection

#### **Environmental resistance**



Fiber unit with a heat resistance of 130°C or below. Free cut types are also available.



Fiber unit with a maximum heat resistance of 180°C to 200°C. Free cut types are also available.



Fiber unit with a maximum heat resistance of 250°C to 350°C.



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



Optimal for use in vacuum chambers. Also features a heat resistance of up to 300°C.

#### **Liquid detection type**



A pipe-mounted type, liquid level contact type, leakage detection type and water detection type are available.

#### Lens for through-beam



Long distance lens for extending sensing distance and side-view lens to minimize space.

Photoelectric Sensors

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Laser Displacement Sensors

Fiber Units

Model selection

M	od	el

FD-SSD11(100)	Model	Page	Model	Page	Model	Page	Model	Page	Model	Page
The color   Phis   Ph	FD-3SD1(100)	P.79	-DH02	P.79	-DR12	P.48	NF-TG01	P.75		P.55
NF-02-0K   P.59   P.60   P.86   P.87   P.75   P.75   P.85   P.8	-ML02		-DH03			P.56	-TG02		-TR12	
NF02-DK	-TT2		-DH04	P.46	NF-DS06	P.37		P.75		P.55
THK	NF02-DK			P.87	NF-DT01	P.37	-TG03	P.75	-TR13	
-DH	-TK	P.59	-DH05	P.45	-DT02	P.45	-TG04	P.75		P.55
T	NF25-D	P.38		P.87		P.51	-TG05	P.41	-TR14	P.36
THE		P.79	-DH06	P.72		P.41		P.47		P.59
NF-DA01		P.36		P.88	-DT04	P.45		P.53	NF-TS07	P.40
DA02	-TH	P.78	-DH07	P.84		P.51	NF-TH01	P.78		P.41
DA03			-DH08							
DA04							-TH04S-27V2			
DA05			-DH10	P.72						
DA06							-TH05S-A			
-DAO7 P.64 NF-DJO1 P.37 NF-DYO1 P.90 -TH07 P.83 -TS22V P.41 P.52 P.55 P.55 P.55 P.56 P.56 P.56 P.56 P.57 P.56 P.57 P.56 P.56 P.56 P.56 P.56 P.57 P.56 P.56 P.56 P.56 P.56 P.56 P.56 P.56			-DH11							
-DA62										
D-DAS3									-TS22V	
NF-DB01										
DB02							-TH09		-TS25	
DB03			-DK04Z							
DB04										
DB05					-RG01				-TS40	
DB06										
DB07					-RR01				NF-1101	
DB08										
DB09					NF-IA01					
DB10					TA 04 C					
NF-DC03					-1A015					
P.76					T400		NF-1KU5			
DC04	NF-DC03				-1A02		TI/77			
P.71	DC04				TAO2					
DC05	-0004				-1A03					
-DC06 P.51 NF-DP01 P.41 P.46 -TA05 P.98 NF-TN01 P.92 -TY02-TF3 P.90 P.65 P.97 NF-DR01 P.50 P.65 P.99 NF-TP01 P.40 P.40 P.40 P.40 P.40 P.40 P.40 P.40	DC05		-DN02		-TA04					
P.71			NF-DP01		-1704		-11000			
DC07	-5000		141 -DI 01		-TΔ05		NF-TN01			
-DC08	-DC07				17100					
P.73			NF-DR01		-TA06					
-DC09 P.73 -DR03 P.42 NF-TB01 P.36 -TR01 P.49 NF-TZ05 P.68 P.51 -TB02 P.36 -TR02 P.49 -TZ06 P.68 P.51 P.51 P.51 P.50 P.54 P.56 P.56 P.56 P.51 P.51 P.50 P.51 P.56 P.56 P.56 P.56 P.56 P.56 P.56 P.56	2000									
-DC38 P.72 P.51 -TB02 P.36 -TR02 P.49 -TZ06 P.68 P.50 P.51 P.51 P.50 P.68 P.56 P.56 P.56 P.56 P.56 P.56 P.56 P.56	-DC09						-TR01			
-DC39 P.73 -DR04 P.41 -TB03 P.44 -TR03 P.40 -TZ07 P.54 P.50 P.56 P.56 P.56 P.56 P.56 P.42 P.50 P.56 P.56 P.56 P.56 P.56 P.56 P.56 P.56										
NF-DE01         P.34         P.51         -TB05         P.44         P.49         P.68           P.56         -DR05         P.42         -TB06         P.36         P.65         -TZ08         P.50           -DE02         P.34         P.56         P.46         -TB07         P.40         -TR04         P.40         P.67           P.56         P.51         NF-TE01         P.32         P.49         -TZ08         P.50           -DE03         P.34         -DR06         P.51         P.54         P.65         P.49         P.54           -DE04         P.34         -DR06         P.51         P.54         P.65         P.33         -TZ10         P.50           -DE04         P.34         -DR08         P.50         P.54         P.50         P.50           P.57         -DR09         P.56         -TE03         P.32         -TR06         P.33           NF-DF03         P.96         P.76         P.54         P.50           -DF04         P.95         -DR10         P.45         -TE04         P.33         -TR08         P.53           -DF05         P.95         -DR11         P.42         -TE05         P.33         -TR10			-DR04		-TB03					
P.56         -DR05         P.42         -TB06         P.36         P.36         P.65         -TZ08         P.50           -DE02         P.34         P.56         P.51         NF-TE01         P.32         P.49         -TZ09         P.54           -DE03         P.34         -DR06         P.51         P.54         P.65         P.65         P.54           -DE03         P.56         -DR07         P.46         -TE02         P.33         -TR05         P.33         -TZ10         P.50           -DE04         P.34         -DR08         P.50         P.54         P.50         P.50           -DE04         P.34         -DR08         P.50         P.54         P.50         P.50           P.57         -DR09         P.56         -TE03         P.32         -TR06         P.33           NF-DF03         P.96         P.76         P.54         P.50           -DF04         P.95         -DR10         P.45         -TE04         P.33         -TR08         P.53           -DF05         P.95         -DR11         P.42         -TE05         P.33         -TR10         P.40           -DF08         P.96         P.59         P.50					-TB05					
-DE02 P.34 P.56 P.51 P.50 P.50 P.50 P.50 P.50 P.50 P.50 P.50			-DR05		-TB06				-TZ08	
P.56         P.51         NF-TE01         P.32         P.49         -TZ09         P.54           -DE03         P.34         -DR06         P.51         P.54         P.65         P.65         P.67           P.56         -DR07         P.46         -TE02         P.33         -TR05         P.33         -TZ10         P.50           -DE04         P.34         -DR08         P.50         P.54         P.50         P.50           P.57         -DR09         P.56         -TE03         P.32         -TR06         P.33           NF-DF03         P.96         P.76         P.54         P.50         P.50           -DF04         P.95         -DR10         P.45         -TE04         P.33         -TR08         P.53           -DF05         P.95         P.56         P.55         -TR09         P.53           -DF07         P.95         -DR11         P.42         -TE05         P.33         -TR10         P.40           -DF08         P.96         P.59         P.50         P.50         P.53	-DE02				-TB07		-TR04			
-DE03 P.34 -DR06 P.51 P.54 P.65 P.67 P.56 -DR07 P.46 -TE02 P.33 -TR05 P.33 -TZ10 P.50 -DE04 P.34 -DR08 P.50 P.56 P.54 P.50 P.57 -DR09 P.56 -TE03 P.32 -TR06 P.33  NF-DF03 P.96 P.76 P.54 P.50 -DF04 P.95 -DR10 P.45 -TE04 P.33 -TR08 P.53 -DF05 P.95 P.56 P.55 -TR09 P.53 -DF07 P.95 -DR11 P.42 -TE05 P.33 -TR10 P.40 -DF08 P.96 P.59 P.50 P.50					NF-TE01				-TZ09	
P.56   -DR07   P.46   -TE02   P.33   -TR05   P.33   -TZ10   P.50    -DE04   P.34   -DR08   P.50   P.54   P.50   P.50    -DE04   P.57   -DR09   P.56   -TE03   P.32   -TR06   P.33    -DF03   P.96   P.76   P.54   P.50    -DF04   P.95   -DR10   P.45   -TE04   P.33   -TR08   P.53    -DF05   P.95   P.56   P.55   -TR09   P.53    -DF07   P.95   -DR11   P.42   -TE05   P.33   -TR10   P.40    -DF08   P.96   P.59   P.50   P.53	-DE03		-DR06							
-DE04 P.34 -DR08 P.50 P.54 P.50 P.67  P.57 -DR09 P.56 -TE03 P.32 -TR06 P.33  NF-DF03 P.96 P.76 P.54 P.50  -DF04 P.95 -DR10 P.45 -TE04 P.33 -TR08 P.53  -DF05 P.95 P.56 P.55 -TR09 P.53  -DF07 P.95 -DR11 P.42 -TE05 P.33 -TR10 P.40  -DF08 P.96 P.59 P.50 P.50		I .	-DR07		-TE02		-TR05		-TZ10	
P.57         -DR09         P.56         -TE03         P.32         -TR06         P.33           NF-DF03         P.96         P.76         P.54         P.50           -DF04         P.95         -DR10         P.45         -TE04         P.33         -TR08         P.53           -DF05         P.95         P.56         P.55         -TR09         P.53           -DF07         P.95         -DR11         P.42         -TE05         P.33         -TR10         P.40           -DF08         P.96         P.59         P.50         P.50         P.53	-DE04		-DR08							
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-DF05         P.95         P.56         P.55         -TR09         P.53           -DF07         P.95         -DR11         P.42         -TE05         P.33         -TR10         P.40           -DF08         P.96         P.59         P.50         P.53	-DF04		-DR10		-TE04		-TR08			
-DF07 P.95 -DR11 P.42 -TE05 P.33 -TR10 P.40 -DF08 P.96 P.59 P.50 P.53	-DF05						-TR09			
-DF08 P.96 P.59 P.50 P.53			-DR11	P.42	-TE05		-TR10			
	-DF08							P.53		
	NF-DH01		-DR12	P.42	NF-TF01	P.95	-TR11	P.32		







### 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.



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 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

through-beam type

Correct use

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Fiber Units

#### Easy mounting

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Vacuum resistant

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water detection

through-beam type

Correct use

#### Easy mounting fiber units (through-beam type)

Туре	Features/dimensions (mm)	Sensing dis	tance (mm)	BRF	Ambient temperature	Bending radius	Model
	Flexible, Head ON, Free cut  Detecting part detail Lens 12 2000 part detail Lens 21 11 (20)  Multi core Flex 11 11 (20)  Multi core Flex 2000  Polycarbonate)  1.75 1.75 2.50 (20)	7-EL 3,600 6-UL 3,600 5-PL 3,580 446 3,060 3-ST 1,980 2-FS 1,350 1-HS	Long 2,700 Std 1,600 Fast 850	1,600	-40 to +60°C	R1	NF-TR11
	Flexible, Side ON, Free cut  Detecting part detail 12 2000    11 (20)	7-EL 3,600 6-UL 3,600 6-PL 3,600 4-LG 3,150 3-ST 2,000 2-FS 1,200 1-HS 540	2,700 Std 1,500 Fast 1,000	1,300	-40 to +60°C	R1	NF-TR12
Through-beam type	Flexible, Flat ON, Free cut  0.5	7-EL 1,190 6-UL 1,120 5-PL 980 44-G 850 3-ST 550 2-FS 310 1-HS 100	Long 600 Std 350 Fast 200	220	-40 to +60°C	R1	NF-TEO1
	Flexible, Flat ON, Free cut  2000  3.5  7  2000  3.5  12  Inner pipe (SUS)  7  201  202.4 Housing  Prism  (Polycarbonate)  (acrylic)  Detecting part detail  1.05  Multi core fiber e0.075 x 151	7-EL 1,890 6-UL 1,770 5-PL 1,540 44.6 1,350 3-ST 880 2-F8 520 1-HS	Long 900 Std 500 Fast 350	450	-40 to +60°C	R1	NF-TEO3
	Flexible, Flat ON, Free cut  3	7-EL 2,450 6-UL 2,300 5-FL 2,010 44.6 1,710 3-ST 1,150 2-FS 650 1-HS	Long 1,200 Std 650 Fast 330	500	-40 to +60°C	R1	NF-TR13

<sup>•</sup>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 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

#### Easy mounting fiber units (through-beam type)

Туре	Features/dimensions (mm)	Sensing dis	1		Ambient	Bending radius	Model
Турс		D3RF	D2RF	BRF	temperature	(mm)	Model
	Flexible, Head ON/Side ON switchable type, Free cut  1000 0.5+1-2 3.5 1000 1.05 1.05 1.05 1.05 1.05 1.05 1.05	7-EL 430 6-UL 4400 5-PL 350 4-LG 3000 3-ST 190 2-FS 120 1-HS 36	Long 250 Std 120 Fast 55	110	-40 to +60°C	R1	NF-TEO2 Switchable direction
	Flexible, Head ON/Side ON switchable type, Free cut  2000  1 2000  1 2000  1 3.5 3.5	7-EL 1,340 6-UL 1,260 5-FL 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-TEO4 (Switchable direction)
Through-beam type	Flexible, Head ON, Free cut  Detecting 8 2.5 Light axis part detail Light axis 4 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	7-EL 3,600 6-UL 3,600 6-PL 3,580 4-LG 3,060 3-ST 1,980 2-FS 1,400 1-HS 500	2,700 Std 1,600 Fast 850	1,100	-40 to +60°C	R4	NF-TRO6
	Flexible, Side ON, Free cut  Detecting 8 2.5 3.5 2.5 2.01.25  Housing Polycarbonate Light axis 7.5 2.02.2  Those for emitting and receiving are symmetrical in shape.	7-EL 3,600 6-UL 3,600 5-FL 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-TRO5
	Flexible, Flat ON, Free cut  Detecting 8.5 2.2 2.4 2.4 2.4 2.4 2.4 2.4 2.4 2.4 2.4	7-EL 1,600 6-UL 1,510 5-PL 1,320 4-UG 1,150 3-ST 750 2-FS 410 1-HS 130	Long 750 Std 450 Fast 280	300	-40 to +60°C	R4	NF-TEO5

<sup>●</sup>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 resistant

Vacuum resistant

Liquid level/liquid leakage/

water detection

through-beam type

Correct use

#### Easy mounting fiber units (diffuse type)

Toma	Ecoturos/dimi	Sensing of	distance (mm)		Ambient	Bending radius	Model
Туре	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
	Flexible, Flat ON, Free cut  7 1000 3.5 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2	7-EL 140 6-UL 135 5-PL 110 4-LG 99 3-ST 70 2-FS 34 1-HS 10	Long Std 60 Std 30 Fast 10 to 16	30	-40 to +60°C	R1	NF-DE01
type	Flexible, Flat ON, Free cut  7 2000 3.5 1.2 Inner pipe (SUS) Multi core fiber (core: acrylic, sheath: polyethylene) 4.6.5 2.2 Detecting part detail Multi core fiber 00.075 x 151  (20) Housing (Polycarbonate)  03.2 (PVC) Housing (Polycarbonate)	7-EL 490 6-UL 450 5-PL 400 4-LG 350 3-ST 225 2-FS 117 1-HS 41	250 Std 100 Fast 60	100	-40 to +60°C	R1	NF-DE03
Diffuse type	Flexible, Head ON/Side ON switchable type, Free cut  100  0.5 + -2	7-EL 160 6-UL 150 5-PL 130 4-LG 117 3-ST 77 2-FS 43 1-HS	Long 65 Stet 35 Fast 20	30	-40 to +60°C	R1	NF-DE02 Switchable direction
	Flexible, Head ON/Side ON switchable type, Free cut 2000  11  a3.5  a3.5  Inner pipe (SUS)  Multi core fiber  o2.4  Housing  (Polycarbonate)  part detail  Multi core fiber  o0.075 x 151  o1.3 x 2  o1.3 x 2	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-DEO4 (Switchable direction

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

<sup>●</sup>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 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

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

through-beam type

Correct use

#### 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)

Τ\	ре	Features/dimensions (mm)	Sensing dis			Ambient	Bending radius	Model
.,	PC		<b>D3RF</b> 7-EL 3-ST	D2RF	BRF	temperature	(mm)	Model
	МЗ	M3 × P0.5 (brass with nickel plating)  1.8 01.3  2.5 10 2000	3,500 1,000 6-UL 2,100 5-PL 1,600 1.HS 175 4-LG 1,400	1,000 Std 500 Fast 250	450	-40 to +70°C	R25	NF-TM01
		Pree cut  02 SUS  M3 × P0.5 SUS  01  1.8  01  2.4  5.5  10  2000	900 250 6-UL 2-FS 550 140 4-LS 45 450 4-LS 350	Long 350 Std 200 Fast 90	120	-40 to +70°C	R15	NF-TM02
		Lens attachable (P.98), Free cut  M2.6 × P0.45 SUS  M4 × P0.7 SUS  2.4  91.5 × 1  3  3  12  2000	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 × P0.45 SUS  M4 × P0.7 SUS  2.4  92.2  91 × 1  3  3  12  2000	7-EL 4,000 6-UL 2,000 5-PL 1,600 4-LG 1,400	Long 1,000 Std 500 Fast 250	450	-40 to +70°C	R25	NF-TB02
Through-beam type	M4	Metal sheath, Lens attachable (P.98)  Screwing side  12  04  4.7  04  35  02.2  Plastic plug Width across flats Width across flats (PA)  Toothed washer ø8.5  Mounting bracket (brass with nickel plating) part detail  00.265 × 16	7-EL 1,590 6-UL 1,440 5-PL 1,260 4-LG 1,140 3-ST 7-40 2-FS 410 1-HS 130	Long 350 Std 220 Fast 110	300	-40 to +60°C	R10	NF-TJO1  Breakage prevention
Thr		Nut type, Straight view/side view switchable type, Flexible, Free cut  7	7-EL 3,800 6-UL 2,700 5-PL 2,200 4-LG 1,800	Long 1,300 Std 600 Fast 300	400	-40 to +60°C	R2	NF-TR14 Switchable direction
		Nut type, Free cut  10.5 2000  14.4 4.4 4.4 Polyamide (PA6) 3.5 Lens: PC 02.2	7-EL 2,500 6-UL 1,400 5-PL 1,300 4-U <sub>6</sub> 1,000	Long 800 Std 600 Fast 200	350	-40 to +70°C	R25	NF25-T Space-saving
		Elbow type, Lens attachable (P.98), Free cut  03.2 (PVC)  02.7  2000  02.2  03.2 (PVC)  04.2  05.5  05.7  06.5  07.2 (SUS)  09.5  09	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) e2.2  e10.4  Glass lens (BK7)  26  27.2  20000	7-EL 38,000 12,000 2-FS 25,000 5-PL 20,000 4-LG 18,000	Long 12,000 Std 6,500 Fast 3,500	2,800	-40 to +70°C	R30	NF-TX01

<sup>●</sup>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 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/diffuse type)

Тур	е	Features/dimensions (mm)	Sensing di		DDF	Ambient temperature	Bending radius	Model
		Free cut 2.7 Price plating 3 (10) 5 100 100 100 100 100 100 100 100 100 1	7-EL 300 80 6-UL 1-HS 150 4-LG 120	D2RF  Long 100 Std 50 Fast 25	35	-40 to +70°C	R15	FD-TT2 Low cost
		Standard, Free cut  00.5 × 2  01.8	7-EL 400 3-ST 100 6-UL 2-FS 50 5-PL 1-HS 100 4-LG 160 100 100 100 100 100 100 100 100 100	Long 100 Std 60 Fast 30	45	-40 to +70°C	R15	NF-DS06
		Coaxial, Lens attachable (P.64), Free cut o0.25 x 9 o0.5 x 1 (receiving part) (emitting part)  Detecting part detail  Detecting part detail	7-EL 500 3-ST 150 6-UL 2-FS 300 100 5-PL 1-HS 4-LG 4-LG 225	Long 250 Std 120 Fast 50	70	-40 to +70°C	R15	NF-DT01
	МЗ	Detecting part detail Receiving: e0.265 x 9 Installing side  1.2	7-EL 310 6-UL 290 5-PL 260 4-LG 220 3-ST 140 2-FS 70 1-HS	Long 170 Std 80 Fast 45	55	-40 to +60°C	R25	NF-DB07
Diffuse type		Coaxial, Lens attachable (P.64)  o0.125 × 10  (receiving part)  Detecting part detail	7-EL 3-ST 60 60 6-UL 2-FS 110 40 5-PL 1+HS 12 4-LG 85 5	Long 70 Std 40 Fast 15	20	-40 to +70°C	R15	NF-DK21
		Coaxial, Metal sheath  Detecting part detail  Receiving:  0.25 x 9 1.2  12  300  700  (cut table range)  91  Emitting:  0.5 x 1  (SUS)  M3 x 0.5  Width across flats 5.5 thickness 1.8	7-EL 180 6-UL 170 5-PL 150	Long 120 Std 50 Fast 30	50	-40 to +60°C	R10	NF-DJ01  Breakage prevention
	M	Standard, Free cut  M4 × P0.7 SUS  01 × 2  01.3  12 2000	7-EL 3-ST 350 6-UL 2-FS 200 5-PL 1-HS 650 4-LG 450	Long 400 Std 250 Fast 100	160	-40 to +70°C	R25	NF-DM01
	<b>M</b> 4	Coaxial, Lens attachable (P.64), Free cut  o0.25 × 9	7-EL 500 150 6-UL 2-FS 300 100 5-PL 250 30 4-LG 225	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 × 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

110110 1011001111

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 (diffuse type)

Tv	ре	Features/dimensions (mm)	Sensing dis			Ambient	Bending radius	Model
ıy	he		D3RF	D2RF	BRF	temperature	(mm)	IVIOUEI
	M4	Coaxial, Lens attachable (P.64), Free cut  8-90.265 (receiving part)  0.5 (emitting part)  Detecting part detail  0.5 (emitting part)	7-EL 3-ST 680 150 6-UL 2-FS 90 5-PL 1-HS 270 4-LG 230	Long 140 Std 70 Fast 30	70	-40 to +70°C	R15	NF-DM02-G4
		Standard, Free cut  M6 × P0.75  SUS303  02.2  04  3  18  2000	7-EL 1,200 400 6-UL 2-FS 750 250 5-PL 1+HS 80 550	Long 400 Std 250 Fast 100	160	-40 to +70°C	R25	NF-DK06
		Coaxial, Free cut  02.5 SUS  00.25 x 16 (receiving part)  02.5 SUS  02.5 SUS  02.2  02.2  02.2  02.2  03.5 SUS  04.2  05.5 SUS  05.5 SUS  06.2  06.2  07.5 SUS  08.2  09	7-EL 1,200 4.00 2.75 400 5.9-L 1.48 650 4.6 550	Long 450 Std 250 Fast 100	150	-40 to +70°C	R25	NF-DB01  Low cost
		Coaxial, Free cut  e0.25 × 16 (receiving part)  Detecting part detail  e0.25 × 16 (receiving part)  emitting part)  e0.25 × 16 (receiving part)	7-EL 1,200 400 2-FS 250 5-PL 650 4-G 755	Long 450 Std 250 Fast 100	150	-40 to +70°C	R25	NF-DB03
O		Coaxial, Free cut  0025 × 16 (receiving part)  01 × 1  (emitting part)  Detecting part detail M4 × P0.7  SUS303  M6 × P0.75	7-EL 1,200 3.5T 150 150 150 150 150 150 500 500 500 500	Long 450 Std 250 Fast 100	80	-40 to +70°C	R25	NF-DB04
Diffuse type	М6	Nut type, Free cut  12 2000  10 2.4 6.8  Lens: PC 2-62.2  M6 P=1.0  Polyamide (PA6)	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  200  e5.1 (PVC)  660)  2000  e1.5 × 2 (SUS)  75  13  90°±5°  Toothed washer e11  Width across flats 10 thickness 2  Screwing side  Screwing side	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  Screwing side  15  04.5  04.5  Detecting (brass with part detal intickel plating)  Receiving: 0.025 x 9  Receiving: 0.025 x 9  Toothed washer ø11  1000  35  02.2  04.3  Plastic plug (PA)  Liner tube (SUS)  Intermediate bracket (brass with rickel plating)	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.



### Cylindrical type

# **Photoelectric**

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

through-beam type

Correct use

### 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-DR05

Fiber unit with a core diameter of Ø0.25 to 0.5 mm. Recommended for small object detection or high accuracy positioning purposes.

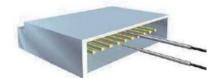
Side view type



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 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

#### Cylindrical fiber units (through-beam type)

Ty	/ре	Features/dimensions (mm)	Sensing dis			Ambient	Bending radius	Model
		Fine core, Flexible	D3RF	D2RF	BRF	temperature	(mm)	
	ø1	500  (Set screw installing range) 35 (20) 18.3  o1 (SUS) 00.7 (SUS) 04.33 (PA)  Detecting part detail	7-EL 54 6-UL 50 5-PL 44 4-LG 38 3-ST 25 2-FS 1-15 1-HS 5	Long 30 Std 18 Fast 8	10	-40 to +60°C	R4	NF-TRO4 Fine core
	ø1.5	Fine core, Flexible  e0.5 × 1  ©  10  2000  e1.5 SUS	7-EL 900 250 6-UL 2-FS 550 140 5-PL 1-HS 45 4-LG 350	Long 350 Std 200 Fast 90	120	-40 to +70°C	R15	NF-TM03 Fine core Low cost
	51.0	Fine core, Flexible, Free cut  00.25 × 4  10  1000  01.5 SUS	7-EL 8-50 2-75 6-UL 550 150 5-PL 4-50 4-LG 400	Long 350 Std 200 Fast 90	110	-40 to +70°C	R4	NF-TR03 Fine core
Through-beam type	ø2.5	8 2000 (20) (3) (20) (3) (FVC) (62.5 (SUS)	7-EL 1,710 6-UL 1,530 5-PL 1,350 4-LG 1,230 3-ST 800 2-FS 480 1-HS	Long 900 Std 550 Fest 250	350	-40 to +70°C	R25	NF-TB07 Low cost
Thro		Lens installed, Flexible, Free cut  2000  22 lens  Detecting part detail 0  3 (SUS)  Multi core fiber Ø0.075 × 151	7-EL 3,600 1,800 6-UL 2,FS 1 1,800 1,000 1	2,300 Std 1,300 Fast 550	550	-40 to +60°C	R1	NF-TR10
		Flexible, Free cut  91.0 × 1  Sus303  Sus303	7-EL 4,000 1,000 6-UL 2,000 550 550 4-U. 1-HS 180 4-U. 1,400	Long 800 Std 400 Fast 200	360	-40 to +70°C	R2	NF-TK05
	ø3	Free cut  e1.5 × 1  Sus  Sus  Sus	3.58T 4,000 6-UL 3,000 5-PL 2,400 4-L6 2,100	1,800 Std 800 Fast 450	700	-40 to +70°C	R30	NF-TS07
		00.25 fine sleeve: 5 mm long  00.25 (SUS)  00.125 Fiber x 1  00.12	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

<sup>●</sup>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/R2

Retro-reflective

Small object detection

Screen/Array

Limited diffuse

Narrow view/

wafer mapping

Heat resistant

Chemical

vacuum resistant

Liquid level/liquid leakage water detection

Lens for through-beam type

Correct use

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

-			Sensing dis	stance (mm)		Ambient	Bending radius	
ıy	pe	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
eam type	ø2	o1 sleeve: 15 mm long, Side view, Flexible, Free cut  2000  22.5 (PVC)  2000  22.5 (PVC)  2000  22.5 (PVC)  2000  Multi core fiber  20.05 x 151	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
Through-beam type	ø3	Side view, Free cut Detecting part detail Chamfering 30 2000 1.8 0 2000 1.5 0 2000 2.8 0 2.2	7-EL 2,500 6-UL 1,900 4-U 1,300 4-LG 1,100	Long 800 Std 400 Fast 200	180	-40 to +70°C	R25	NF-TS08
Side view	ø4	Side view, Free cut  Light 25 2000  Aust 12 (Screw installing range)  25 (20)  3,71 (20)  Set screw installing part (e2.5) o4 (PVC)  part detail	7-EL 3,600 2,100 6-UL 3,600 1,600 1,600 4-G 3,240 530	2,800 Std 2,100 Fast 1,000	1,000	-40 to +60°C	R25	NF-TV08
	, 194   194	Side view, Flexible, Free cut  2.8 3 3 0 2000  2.2	7-EL 3,500 2,000 2,000 3.5T 2,000 5-PL 3,500 1-HS 300 4-LG 3,000	Long 1,800 Std 1,000 Fast 500	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)

Т	ре	Features/dimensions (mm)	Sensing dis	stance (mm)		Ambient	Bending radius	Model
13	pe	reatures/difficultsions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Wiodei
e type	ø1.5	00.5 sleeve: 3 mm long, Fine  3.7  00.5 +3 15 1000  (SUS) 20 100  35 18.3  05.3 35 18.3  00.9 × 2  00.9 × 2  00.9 × 2  00.125 × 4  00.125 × 4	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
Diffuse type		Flexible 60.25 x 2 15 1000 60.25 x 2 15 1000 60.25 x 2 6	7-EL 3-ST 80 8-UL 2-FS 180 45 5-PL 1-HS 150 48 130 18	Long 70 Std 30 Fast 15	20	-40 to +70°C	R4	NF-DR04
	ø2.5	Free cut  00.5 × 2  02.5  SUS  01	7-EL 400 3-ST 100 6-UL 2-FS 50 5-PL 190 4-LG 160	Long 100 Std 60 Fast 30	45	-40 to +70°C	R15	NF-DT03

- ●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 resistant

Vacuum resistant

Liquid level/liquid leakage/ water detection

Lens for

through-beam type

Correct use

#### Cylindrical fiber units (diffuse type)

	T	Factorial Allinois and Allinois	Sensing dis	stance (mm)		Ambient	Bending radius	Madal
	Туре	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
		Prec cut  15 2000  17 17 19 19 19 19 19 19 19 19 19 19 19 19 19	7-EL 690 3-ST 320 6-UL 640 190 5-PL 1-H/S 560 4-LG 490	Long 400 Std 200 Fast 100	150	-40 to +70°C	R25	NF-DB10 Standard item
		Coaxial, Flexible, Free cut  15 2000 2000 2000 2000 2000 2000 2000	7-EL 270 6-UL 250 5-PL 210 4-LG 180 3-ST 120 2-FS 60 1-HS	Long 120 Std 70 Fast 35	55	-40 to +60°C	R2	NF-DR11
Diffuse type	ø3	Free cut  01.0 × 2  8 03  01.3  SUS303	7-EL 1,200 6-UL 750 5-PL 650 4-LG 550	Long 400 Std 250 Fast 100	160	-40 to +70°C	R25	NF-DK04 Low cost
		Flexible, Free cut  17 2000  10.0 × 2 8 03 5US303	7-EL 850 6-UL 275 550 170 5-PL 1+HS 450 375	Long 300 Std 180 Fast 80	110	-40 to +70°C	R2	NF-DK04Z
		Flexible, Free cut  a0.25 × 4 (eceiving part) (emitting part)  Detecting part detail  Detecting part detail	7-EL 450 3-8T 120 6-UL 2-FS 70 5-PL 1-HS 190 4-LG 160	Long 120 Std 50 Fast 25	35	-40 to +70°C	R4	NF-DR03
		00.82 sleeve: 5 mm long, Flexible  00.25 × 1 (receiving part)  00.25 × 1 (emitting part)  00.82 SUS  00.82 SUS  00.82 SUS  00.82 SUS  03 joint bracket SUS  03 joint bracket SUS	7-EL 190 45 6-UL 2-FS 125 5-PL 75 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)

7	уре	Features/dimensions (mm)	Sensing dis	stance (mm)		Ambient	Bending radius	Model
	ype	reatures/difficultsions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Wodei
Diffuse type	ø3	02 sleeve: 15 mm long, Flexible, Free cut  2000  2000  2000  61 × 2  61 × 2  61 × 2  61 × 2  61 × 2  62 (SUS)  63 (SUS)  63 (SUS)  63 (SUS)  63 (SUS)  63 (SUS)  64 × 2  65 × 61 × 2  67 × 61 × 2  68 × 61 × 61 × 61 × 61 × 61 × 61 × 61 ×	7-EL 53 6-UL 5-U 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

- ullet The sensing distances for the diffuse type fiber units are values on 500  $\times$  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.

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

through-beam type

Correct use

## Sleeve type (straight view)









Fiber amplifier



### 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

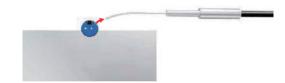
Long sleeve type can be bent (up to R10 mm). Fine tuning of the sensing position is possible even after the mounting position has been determined.

#### 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: 5, NF-TP01, NF-TT01 Diffuse type: NF-DB05, NF-DT04, NF-DT02, NF-DP01 NF-DR05, NF-DR07

#### 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

#### Sleeve fiber units (through-beam type)

	T	F		Sensing dis	tance (mm)		Ambient	Bending radius	Mardal
	Туре	Features/dimensions	6 (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
	М	00.88 sleeve: 40 mm long, Free cut  40  10 Bendable 10 5  Screwing side 00.5 × 1  00.88 (SUS) M3 × 0.5  (SUS)	2000  Width across flats 5.5 thickness 1.8 Toothed washer ø6.5	7-EL 470 6-UL 450 5-PL 380 4-LG 3-ST 220 2-FS 120 1-HS 45	270 8td 140 Fast 80	100	-40 to +70°C	Fiber R25 Sleeve R10	NF-TB05 Bendable sleeve
	M	ø1.5 SUS	5 2000 M4 × P0.7 SUS	4,000 3-ST 1,200 6-JL 1,900 550 1-HS 14-G 180	1,000 Std 600 Fast 250	450	-40 to +70°C	Fiber R25 Sleeve R15	NF-TB03 Bendable sleeve
Court mood delicade		e2.1 (SUS)  o3 (SUS)  Moto (Brass  M4 × 0.7 (SUS)  Toothed washer e8.5 (S	1, temperature type 150 16.7 18.3 002000018 002.9 (SUS) unting bracket s with nickel plating) kness 2.4 (SUS)	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
	ø:	ø0.25 fine sleeve: 5 mm long	35 18.3 01.2 04.33 (PA)	7-EL 3-ST 12 6-UL 2-FS 7 5-PL 1-HS 21 2 4-LG 18	Long 6 Std 3.5 Fast 2	1	-40 to +70°C	R5	NF-TP01 Fine core
		o0.5 fine sleeve: 5 mm long, Free cut	15 2000 \ø3 SUS \ø1	7-EL 3-ST 50 6-UL 110 25 1-HS 80 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.

-	Гуре	Fachuse /dimensions /	Sensing dis	stance (mm)		Ambient	Bending radius	Model
	ype	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Wiodei
Diffuse type		00.8 sleeve: 15 mm long, Coaxial  Detecting part detail  Receiving: 00.125 x 9  00.8 (SUS)  00.8 (SUS)	7-EL 99 6-UL 90 5-PL 80 4-LG 70 3-ST 40 2-FS 20 1-HS 7	Long 50 Std 25 Fast 14	20	-20 to +60°C	R25	NF-DB05 Fine core

- ●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**

### 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

through-beam type

Correct use

т.	ре	Features/dimensions (mm)	Sensing dis			Ambient	Bending radius	Model
- 13	PC	. ,	D3RF	D2RF	BRF	temperature	(mm)	Wiodei
	M3	o0.82 sleeve: 15 mm long, Flexible Coaxial  o0.125 x 9 (receiving part)  o0.25 x 1 (emitting part)  Detecting part detail  o0.82 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	Long 70 Std 40 Fast 15	15	-40 to +70°C	R4	NF-DT04
		00.82 sleeve: 15 mm long Flexible, Free cut  Receiving: 00.25 x 1  Emitting: 00.25 x 1  2.4  00.82 SUS  15 10 5 500  11.8 693 SUS \01  M3 x P0.5 SUS	7-EL 190 4-5 45 2-FS 2-FS 70 4-L6 65	Long 40 Std 15 Fast	10	-40 to +70°C	R4	NF-DT02
		o1.48 sleeve: 40 mm long, Free cut  40	7-EL 195 6-UL 180 5-PL 160 4-LG 1440 3-ST 90 2-FS 50 1-HS	Long 110 Std 50 Fast 30	40	-40 to +70°C	Fiber R25 Sleeve R10	NF-DBO8 Bendable sleeve
Diffuse type		01.5 sleeve: 28 mm long, Free cut 00.5 × 1 (ecciving part) 00.5 × 1 (emitting part) 01.5 SUS 02.5 SUS 04.5 SUS 04.5 SUS 05.5 SUS 06.5 SUS 06.5 SUS 07.5 SUS	7-EL 450 6-UL 240 60 5-PL 220 4-LG 11-HS	Long 100 Std 60 Fast 30	45	-40 to +70°C	R15	NF-DT05
	M4	01.5 sleeve: 90 mm long, Free cut  00.5 × 1 (receiving part)  00.5 × 1 (emitting part)  01.5 SUS  02.5 SUS  04.4 × P0.7 SUS	7-EL 450 120 2-FS 60 14-L 220 14-L 16 190 16	Long 120 Std 50 Fast 30	45	-40 to +70°C	Fiber R15 Sleeve R10	NF-DM03 Bendable sleeve
		o1.48 sleeve: 40 mm long, Flexible, Free cut  40 2000  10 Bendble 10 5  Width across flats 7 thickness 2.4  Toothed washer ø8.5  Multi core fiber (e0.05 × 151) × 2  Screwing side	7-EL 140 6-UL 135 5-PL 110 4-LG 95 9-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
		02.1 sleeve: 90 mm long, Heat resistant  Bendable range 90 27 1000  Bendable range 90 27 1000  Bendable range 90 27 1000  So um × 380  OA 10.7 18.3  OB 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.	7-EL 1,110 6-UL 1,050 5-PL 910 4-LG 800 3-ST 520 2-FS 190 1-HS	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 × 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 resistant

Vacuum resistant

Liquid level/liquid leakage/

water detection

Lens for through-beam type

Correct use

Ту	ре	Features/dimensions (mm)	Sensing dis	stance (mm)	BRF	Ambient temperature	Bending radius	Model
		02.5 sleeve: 40 mm long, Free cut  40  15  2000  (20)  (75)	7-EL 680 6-UL 630				,	
		Detecting part detail  o1 × 2  Screwing side	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
	M6	02.5 sleeve: 90 mm long, Free cut Detecting part detail part detail 02.5 sleeve: 90 mm long, Free cut 02.5 s	7-EL 3-SFT 4.50 4-50 4-16 80 4-16 650 3-SFT 4-16 80 4-16 650	Long 450 Std 250 Fast 100	150	-40 to +70°C	Fiber R25 Sleeve R20	NF-DB02 Bendable sleeve
Diffuse type		02.8 (SUS)  02.8 (SUS)  04 (SUS)  M6 × 0.75 (SUS)  02.8 (SUS)  03.8 (SUS)  04 (SUS)  M6 × 0.75 (SUS)  M6 × 0.75 (SUS)  Mounting pracket (brass with nickel plating)  Mounting plug (PA)	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
Diffus	ø1.5	00.5 sleeve: 3 mm long  00.5   3.7   3.7   1000   100	7-EL 28 6-UL 20 6-FPL 23 4-LG 20 9-ST 13 2-FS 3 1-HS 1	Long 18 Std 5 Fast Unusable	3	-40 to +60°C	R10	NF-DP01 Fine core
	ø3	00.82 sleeve: 5 mm long, Flexible  Detecting part detail  0.25 x 1 (receiving part)  0 0.25 x 1 (emitting part)  0.82 SUS  0.83 SUS  0.84 SUS  0.85 SUS  0.8	7-EL 3-ST 45 4-LG 2-FS 4-LG 65 3-ST 7-FL 2-FS 8	Long 40 Std 15 Fast 5	10	-40 to +70°C	R4	NF-DR05
		00.82 sleeve: 80 mm long Detecting part detail 80 01.25 × 2 00.82 03 01.2 02.1 Sleeve SUS303 SUS304 Connector POM 02.1	7-EL 3-ST 90 25 6-UL 2-FS 50 10 5-PL 11-HS 45 4-UG 40	Long 35 Std 18 Fast 10	7	-40 to +70°C	R25	NF-DR07
	ø4	o1.5 sleeve: 20 mm long, Free cut  Detecting	7-EL 400 100 2-FS 200 5-PL 14-IS 160 160	Long 100 Std 60 Fast 12	45	-40 to +70°C	R15	NF-DK43  Low cost

<sup>●</sup>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.

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

### Sleeve type (side view)

### Side angle light beam provides optimal detection in narrow places

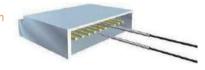


A wide range of variations including flexible types and heat resistant types

#### 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)

_		<b>-</b>	Sensing dis	stance (mm)		Ambient	Bending radius	
ıy	pe	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
	МЗ	o1 sleeve: 10 mm long, Free cut	7-EL 650 200 6-UL 450 100 1-Hs 300 4-Ls 250	Long 200 Std 150 Fast 60	75	-40 to +70°C	R15	NF-TV04 Thin sleeve
Through-beam type	ø2	o1 sleeve: 15 mm long, flexible, Free cut  2000  15 2000  2000  201 2000  202.5 (PVC) 201 201 201 201 201 201 201 201 201 201	7-EL 160 6-UL 150 5-PL 130 4-LG 110 3-ST 76 2-FS 45 1-HS	Long 90 8td 50 Fast 25	20	-40 to +60°C	R1	NF-TG05 Thin sleeve
Throug		o1 sleeve: 10 mm long, Free cut  1	7-EL 650 3-ST 200 6-UL 2-FS 100 5-PL 11-HS 300 4-LS 250	Long 200 Std 150 Fast 60	75	-40 to +70°C	R15	NF-TV02 Thin sleeve
	ø2.5	o1 sleeve: 27 mm long, Heat resistant  Detecting part detail  1.75 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	7-EL 450 6-UL 260 5-PL 240 4-LG 200	Long 120 Std 80 Fast 50	50	-40 to +200°C	R30	NF-TH045-27V2 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.

through-beam type Correct use

#### 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

through-beam type

Correct use

#### Sleeve fiber units (through-beam type)

т.	<b></b>	Footium (dimensions /	Sensing dis	stance (mm)		Ambient	Bending radius	Model
ıy	pe	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
eam type	ø3	01.5 sleeve: 25 mm long, Heat resistant Fiber length: 300 mm and 400 mm (each fiber)  Heat/freezing resistant  07-dinary temperature type 1.5  25 15 300 04±0.3  01.5 (SUS) 03 (SUS)  150 04±0.3  01.5 (SUS) 03 (SUS)  150 04±0.3  01.5 (SUS) 03 (SUS)  150 04±0.3	7-EL 1,600 6-UL 850 5-PL 800 4-LG 600 3-ST 400 2-FS 200 1-HS	Long 350 Std 250 Fast 150	150	-40 to +200°C	R30	NF-TH05S-A (Made-to-order products)
Through-beam type	ø3	o2 sleeve: 20 mm long, Free cut Chamfering 1.5 Detecting part detail 2.8 O2 sleeve: 20 mm long, Free cut O3 sleeve: 20 mm long, Free cut O4 sleeve: 20 mm long, Free cut O5 sleeve: 20 mm long	7-EL 2,000 6-UL 2-FS 300 5-PL 1,000 1-HS 100 4-LG 900	Long 800 Std 400 Fast 200	320	-40 to +70°C	R25	NF-TV01
	·	02 sleeve: 20 mm long 5 m long, Free cut  1	7-EL 1,700 6-UL 1,100 5-PL 850 4-LG 750	Long 600 Std 300 Fast 150	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.

_		<b>-</b> . ,,, .	Sensing dis	stance (mm)		Ambient	Bending radius	
Ту	ре	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
	M6	02.7 sleeve: 20 mm long, Free cut  SUS304  1.5  2.5  Detecting part detail  02.7  15  20  15  2000	7-EL 680 200 6-UL 400 100 100 1-Hs 350 4-Ls 300	Long 200 Std 120 Fast 50	90	-40 to +70°C	R25	NF-DV03
		02.7 sleeve: 20 mm long, Free cut 1.5	7-EL 680 200 2-FS 400 100 5-PL 11-HS 350 4-LG 300	200 Std 120 Fast 50	90	-40 to +70°C	R25	NF-DV01
Diffuse type	ø3	02 sleeve: 15 mm long, Flexible, Free cut  15	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
		02.8 sleeve: 10 mm long, Free cut  1	7-EL 230 3-ST 55 55 5-5 110 30 5-PL 1+HS 85 4-LG 75	Long 80 Std 30 Fast 7	15	-40 to +70°C	R15	NF-DV02
	ø5	02.7 sleeve: 65 mm long, Free cut 1.5 Chamfering 02.7 02.7 02.7 02.7 02.7 02.7 02.7 02.7	7-EL 680 2-FS 2-FS 4-LG 300 3-ST 2-FS 350 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

<sup>•</sup>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 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

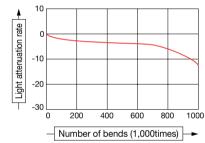
#### Withstands 800,000 cycle bending test

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)

т.		Factoria (dimensione (	Sensing of	distance (mm)		Ambient	Bending radius	Model
ıy	ре	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
	МЗ	M3 × P0.5 SUS  00.25 × 4  1.8  01  10  2000	7-EL 850 275 6-UL 275 550 150 5-PL 450 50 4-LG 400	Long 350 Std 200 Fast 90	110	-40 to +70°C	R4	NF-TR02
eam type	M4	Lens attachable (P.98), Free cut  e0.265 × 16  M2.6 × P0.45  M4 × P0.7  2.4  o2.2  3  12  2000	7-EL 4,000 850 2-FS 2-FS 500 1-HS 1,200 1.75	Long 800 Std 400 Fast 250	330	-40 to +70°C	R4	NF-TR01 Standard item
Through-beam type	ø1	Detecting part detail   0.265 × 1	7-EL 3-ST 25 6-UL 2-FS 50 15 1-HS 44 5 4-LG 38	Long 30 Std 18 Fast 8	10	-40 to +60°C	R4	NF-TR04
	ø1.5	Fine, Free cut  00.25 fiber (4)  10 1000	7-EL 850 275 6-UL 2-FS 2-FS 550 150 1-HS 450 4-LG 400	Long 350 Std 200 Fast 90	110	-40 to +70°C	R4	NF-TRO3

●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

#### Photoelectric Sensors

Specialized Photoelectric Sensors

Laser Displacement Sensors

#### Fiber Units

Easy mounting

Thread type

Cylindrical type

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#### Flexible R4/R2

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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 fiber units (through-beam type)

		F. A (All	Sensing dis	stance (mm)		Ambient	Bending radius	Model
1,7	ре	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
		Detecting part detail 2.2   1   2.000   2.02.2   01.25   0.25 × 7   Housing   1.75 7.5   Light axis   Those for emitting and receiving are symmetrical in shape.	7-EL 1,600 6-UL 1,510 5-PL 1,320 4-LG 1,150	Long 750 Std 450 Fast 280	300	-40 to +60°C	R4	NF-TE05
	Square	Side ON, Free cut Detecting part detail  A Side ON, Free Cut Detecti	7-EL 3,600 6-UL 2,000 6-UL 3,600 6-PL 3,600 4-G 3,150	2,700 Std 1,300 Fast 600	1,100	-40 to +60°C	R4	NF-TRO5
lype		Head ON, Free cut Detecting part detail uight axis 1.75 7.5  Light axis 2.5  Light axis 2.7  L	3,600 6-UL 3,600 5-PL 3,580 4-16 3,060	2,700 Std 1,600 Fast 850	1,100	-40 to +60°C	R4	NF-TR06
Through-beam type	Screen	32 mm wide screen, Side ON, Free cut  Fiber. e0.75 × 1 core (PMMA), sheath of 1.3 (PE)  Window (3.2 × 32), lens (norbornene plastic)  65 4 2000  (19) Light axis Husing PQ   5.2 of 1.3    2 - 03.2 of countersinking (both sides)	7-EL 3,700 6-UI. 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	R2	NF-TZO8 Renewal Collimated light
	San	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 1,500	3,500 3,500 8td 2,500 Fast 1,800	2,500	-40 to +70°C	R2	NF-TZ10 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.

#### Flexible fiber units (diffuse type)

-	уре	Features/dimensions (mm)	Sensing dis	stance (mm)		Ambient	Bending radius	Model
	ype	reatures/difficultsions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Wiodei
Diffuse type	М3	Detecting part detail   Receiving:	7-EL 88 6-UL 80 5-PL 70 4-LG 60 3-ST 40 2-FS 20 1-HS	Long 40 Std 20 Fast 14	20	-40 to +70°C	R4	NF-DR08
		Free cut  M3 × P0.5 SUS  0.25 × 2 (receiving part) 0.25 × 2 (emitting part)  Detecting part detail	7-EL 3000 8-UL 2-FS 45 130 45 16 16 16 100 16 16 16 16 16 16 16 16 16 16 16 16 16	Long 70 Std 30 Fast 15	20	-40 to +70°C	R4	NF-DR02

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

<sup>●</sup>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 Sonotone

#### 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

through-beam type

Correct use

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

Ту	ре	Features/dimensions (mm)	Sensing dis	tance (mm)	BRF	Ambient temperature	Bending radius	Model
	NAO.	00.82 sleeve: 15 mm long, Free cut  00.82 sleeve: 15 mm long, Free cut  00.82 sls  1.8 03 sls  00.82 sls  1.8 03 sls  00.82 sls  1.8 03	7-EL 3-ST 190 45 6-UL 2-FS 125 5-PL 1-HS 70 4-LG 65	Long 40 Std 15 Fast 5	10	-40 to +70°C	R4	NF-DT02
<b>Q</b>	M3	Coaxial of 0.82 sleeve: 15 mm long	7-EL 240 8-8T 60 8-9L 120 35 5-PL 1-HS 100 4-LG 85	Long 70 Std 40 Fast 15	15	-40 to +70°C	R4	NF-DT04
	M4	Free cut	300 80 6-UL 2-FS 45 5-PL 1-HS 16 4-UG 120	Long 120 Std 50 Fast 25	35	-40 to +70°C	R4	NF-DR06
Diffuse type	М6	Free cut  0.265 × 16 0	7-EL 3-SFT 3-SFT 1,100 350 2-FS 230 5-PL 600 4-LG 500	200 Fast 80	130	-40 to +70°C	R4	NF-DR01 Standard item
	ø1.5	o0.25 x 2 (receiving part)     o0.25 x 2 (remitting part)     o1.5 SUS o3 joint bracket SUS 25 o1.2     o2.1 o2.1 o2.1 o2.1 o2.1 o2.1 o2.1 o2.1	300 8-SET 300 80 8-UL 2-FS 45 150 18 45 4-UG 130 18	Long 70 Std 30 Fast 15	20	-40 to +70°C	R4	NF-DR04
		Free cut  00.25 × 4 (receiving part)  Detecting part detail  03.SUS  03.SUS  01  10  2000	7-EL 3-ST 120 120 2-FS 250 70 5-PL 1+HS 14-G 160 25	Long 120 Std 50 Fast 25	35	-40 to +70°C	R4	NF-DR03
		00.82 sleeve: 5 mm long 00.82	7-EL 190 45 6-UL 2-FS 125 5-PL 1-HS 8 65	Long 40 Std 15 Fast 5	10	-40 to +70°C	R4	NF-DR05
reflective type		Glass substrate alignment, Flat ON, Free cut  2 -M3 flush screw hole  29 2000  Emitting/ receiving part  17 10 40 40 40 40 40 40 40 40 40 40 40 40 40	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
Limited diffuse reflectiv		Glass substrate alignment, Flat ON, Free cut  Detecting part detail  Emitting/receiving fiber  90.25 x 9  3000  18  65  2-M3 flush screw hole  2.5  Emitting  side  Emitting  side  10  3.8  Detection  Housing  Heat resistant ABS)  receiving  g distances for the diffuse type fiber units are values on 500	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 8td 0 to 30 Fast 0 to 15	Unusable	0 to +70°C	R4	NF-DC04

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

<sup>•</sup> 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.

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

through-beam type

#### Correct use

### Flexible R1 (R1 mm)





### 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)

Туре	е	Features/dimensions (mm)	Sensing dis	stance (mm)	BRF	Ambient temperature	Bending radius	Model
		Lens attachable (P.98), Free cut  2000  Screwing side  M2.6 x 0.45  Detecting part detail  M4 x 0.7  (Brass with nickel plating)  Multiplaced by the control of the control	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	Long 800 Std 400 Fast 200	360	-40 to +60°C	(mm)	NF-TK77 Low cost
	<b>M</b> 4	00.075 x 151  Nut type, Free cut  7.5 or more (Thread)  8.5   13.9   12.9   12.9   12.0   12.	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-TRO8
Inrough-beam type		Nut type, Lens installed, Free cut  7.5 or more (Thread)  12.9  8.5  14.	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-L6 3,150 3-ST 1,980 2-FS 1,000 1-HS	2,300 2,300 Std 1,300 Fast 550	800	-40 to +60°C	R1	NF-TRO9
	ø2	o1 sleeve: 15 mm long, Side view, Free cut  2000  2000  2000  2000  2000  201  Detecting part detail a0.5 a0.5  Multi core fiber a0.05 x 151	7-EL 160 6-UL 150 5-PL 130 4-LG 110 3-ST 76 2-FS 45 1-HS	Long 90 Std 50 Fast 25	20	-40 to +60°C	R1	NF-TG05
	ø3	Lens installed, Free cut	7-EL 3,600 1,800 6-UL 3,600 5-PL 3,150 1-HS 2,790 340	2,300 Std 1,300 Fast 550	550	-40 to +60°C	R1	NF-TR10
	ø4	Side view, Free cut  Rod prism (glass) lens (material PC) 2.8  Detecting part detail	7-EL 3,500 6-UL 3,500 5-PL 3,500 4-LG 3,000	1,800 Std 1,000 Fast 500	700	-40 to +70°C	R1	NF-TS22V
	ø5	Narrow view, Side view, Free cut  Detecting part detail 3.7 25 2000  Multi core fiber 0.075 x 151 Prism Holder Tip bracket (SUS) 04 (PVC)	7-EL 3,600 6-UL 2,100 2-FS 2,1500 1-HS 520 4-LG 3,300	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

Specialized Photoelectric Sensors

Laser Displacement Sensors

Fiber Units

Easy mounting

Sleeve type
Flexible R4/R2

Thread type

Cylindrical type

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

#### 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

through-beam type

iiougii bouiii typo

Correct use

#### Flexible R1 mm fiber units (through-beam type)

Tv	ре	Features/dimensions (mm)		stance (mm)		Ambient	Bending radius	Model
. ,		11 mm wide screen, Side ON, Free cut	D3RF	D2RF	BRF	temperature	(mm)	Model
	een	Lens (norbornene plastic), window (2.2 x 11)  27  (a) Light axis center  Lens (norbornene plastic), window (2.2 x 11)  27  (b) Light axis	7-EL 3,700 6-UL 3,000 6-PL 3,000 4-L6 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
	Screen	32 mm wide screen, Side ON, Free cut    19	7-EL 3,700 6-UI 3,700 5-FL 3,700 4-L6 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-TZO7 Renewal Collimated light
Through-beam type		Flat ON, Free cut  7 1000 0.5	7-EL 1,190 6-UL 1,120 5-PL 980 4-LG 850 3-ST 550 2-FS 310 1-HS	Long 600 Std 350 Fast 200	220	-40 to +60°C	R1	NF-TEO1
	Square	Head ON/Side ON switchable type, Free cut 100 0.5 100 0.6 100 0.6 100 0.6 100 0.6 100 0.6 100 0.7 100 0.8 100	7-EL 430 6-UL 400 5-PL 350 4-LG 300 3-ST 190 2-FS 120 1-HS 36	250 250 Std 120 Fast 55	110	-40 to +60°C	R1	NF-TEO2  Switchable direction
	والم	Flat ON, Free cut  2000  3.5  3.5  1.2  Inner pipe (SUS)  3.5  (20)  Multi core fiber (acrylic)  Multi core fiber	7-EL 1,890 6-UL 1,770 5-PL 1,540 4-L6 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

<sup>•</sup>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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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)

т.	'no	Features/dimensions ()	Sensing dis	stance (mm)		Ambient	Bending radius	Model
ıy	ре	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	
		Flat ON/Head ON switchable type, Free cut  2000  3.5  11  3.5  13.	7-EL 1,340 6-UL 1,260 5-PL 1,090 4-UG 960 3-ST 630 2-FS 390 1-HS	Long 750 Std 450 Fast 250	280	-40 to +60°C	R1	NF-TEO4 Switchable direction
Through-beam type	Square	Flat ON, Free cut  2000  8.5  12  (20)  8.5  Light axis  Housing (Polycarbonate) 1.75  7.5  0.5  Detecting part detail 01  Multi core fiber 0.075 x 151  *Those for emitting and receiving are symmetrical in shape.	7-EL 2,450 6-UI 2,300 5-PL 2,010 4-LG 1,710 3-ST 1,150 2-PS 650 1-HS 220	Long 1,200 Std 650 Fast 330	500	-40 to +60°C	R1	NF-TR13
Through-b	nbS	Side ON, Free cut  housing (polycarbonate)  12 2000  11 (20)  8 1 3.5 4 (2-92.2)  1.75 - 17.5 Light axis 02.5 (PVC)  Light axis  Light axis  Multi core fiber 00.075 × 151	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	2,700 Std 1,500 Fast 1,000	1,300	-40 to +60°C	R1	NF-TR12
		Head ON, Free cut housing (polycarbonate)  12 2000  2.5 3 - 1	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

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

through-beam type

Correct use

#### Flexible R1 mm fiber units (diffuse type)

Туре	Features/dimensions (mm)	Sensing dis			Ambient	Bending radius	Model
iype		D3RF	D2RF	BRF	temperature	(mm)	Iviouei
M4	Detecting part detail   10   Bendable   10   5   2000	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
ø3	02 sleeve: 15 mm long, Side view, Free cut Detecting part detail 02 (SUS) 15 15 2000 00.5 15 16 (20) 00.5 15 00.05 × 151 00.05 × 151	7-EL 3-ST 20 6-UL 2-FS 50 12 5-PL 1-HS 43 4-LG 36	Long 25 Std 12 Fast 5	10	-40 to +60°C	R1	NF-DR12
	Long range detection, Free cut  2-M3 × 0.5  Glass lens (BK7)  9.5  12  12  14  10  10  11  11  11  11  11  11  11	7-EL 1,070 6-UI. 990 880 4-LG 770 3-ST 500 2-F8 310 1-HS	Long 600 Std 380 Fast 200	250	-40 to +60°C	R1	NF-DR09
Diffuse type	Flat ON Free cut  0.5 + 2 3.5 + Multi core fiber (Polycarbonate) Detecting part detail 00.5  Light axis 1.05  Multi core fiber 0.0375 × 151	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-DEO1
Square	Flat ON, Free cut  Detecting part detail  Multi core fiber o0.075 x 151  7 2000  3.5 1.1.2 Inner pipe (SUS) Multi core fiber (core acrylic, sheath: polyethylene)  7 (20)  1 4 6.5 1 (20)  Prism (Acrylic)  Copylorarbonate)  Light axis  1.05	7-EL 490 6-UL 450 5-PL 400 4-LG 350 3-ST 225 2-F8 1117 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  10  0.5 + 2  1.05	7-EL 160 6-UL 150 5-PL 130 4-LG 117 3-ST 77 2-FS 43 1-HS	Long 65 Std 35 Faat 20	30	-40 to +60°C	R1	NF-DEO2 (Switchable director

- ●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 R1 mm fiber units (diffuse type)

7	уре	Fratures (dimensions (	Sensing dis	stance (mm)		Ambient	Bending radius (mm)	Model
	ype	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature		wodei
Diffuse type	Square	Head ON/Side ON switchable type  Detecting part detail  Free cut  Multi core fiber e0.075 x 151  2000  11  2000  3.5  Inner pipe (SUS)  Multi core fiber (core: acrylic, sheath: polyethylene)  (20)	7-EL 480 6-UL 450 5-PL 390 4-LG 340 3-ST 225 2-FS 117 1-HS 45	250 Std 120 Fast 80	100	-40 to +60°C	R1	NF-DEO4 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.

#### Flexible R1 mm fiber units (retro-reflective type)

Туре	Features/dimensions (mm)	Sensing distance (mm)			Ambient	Bending radius	Model
туре	reatures/difficults(mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
Retro-reflective type	Flexible, Free cut  Glass lens (BK7)  9.5  Attaching the included mounting bracket  Glass lens (BK7)  9.5  1.5  2000  1.0  03.2 (PVC)  Attaching the included mounting bracket  Glass lens (BK7)  9.5  1.5  2000  1.5  2.000  1.5  2.000  1.5  2.000  Multi core fiber  00.075 x 151  Included mounting bracket (SUS)	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

●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 (limited diffuse reflective type)

Type	Footures (dimensions ()	Sensing dis	Sensing distance (mm)			Bending radius	Model
туре	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Wodei
Limited diffuse reflective type	Ultra-small, Flexible, Free cut  1000  1.5  1.5  1.5  1.7  1.7  1.7  1.7  1.7	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	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.

#### 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

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

through-beam type

Correct use

### Flexible R2 (R2 mm)





### 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.



#### 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



# **Photoelectric**

### 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

through-beam type

Correct use

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

Ту	pe	Features/dimensions (mm)	Sensing dis	stance (mm)	BRF	Ambient temperature	Bending radius	Model
		Nut type, Straight view/side view switchable type, Free cut  7 Multi core fiber e0.075 × 151  M4 × P0.7  SUS303  M2.6 × P0.45  10 4 91.5  2000	7-EL 3,800 6-UL 2,700 800 1-HS 300 4-LG	Long 1,300 Std 600 Fast 300	400	-40 to +60°C	R2	NF-TR14  Switchable direction
/pe	M4	Nut type, Free cut  10.5  2000  14.4  4.4  Polyamide (PA6)  3.5	7-EL 2,000 6-UL 550 2-FS 250 1-HS 80	Long 600 Std 500 Fast 150	270	-40 to +70°C	R2	NF02-TK Space-saving
Through-beam type	ø3	91.0 × 1	7-EL 4,000 6-UL 2,000 5-PL 1,600 4-LG 1,400	Long 800 Std 400 Fast 200	360	-40 to +70°C	R2	NF-TK05
Ţ.	Screen	40 mm wide screen, Side ON, Free cut 20 5.1 3 22.3 Light axis Housing (ABS) 69.3 2000 69.3 2000 14.5 13 12.3 43 18.5 Model 7.65 name tube Mounting part: SUS316L 2-3.2 × 6.2 mounting hole 6 × 9 countersriking 1 (both sides)	7-EL 3,600 6-UL 3,600 5.FL 3,600 4-LG 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
	M4	Free cut    M4 × P0.7   SUS303   01.3	7-EL 1,200 6-UL 750 5-PL 650 4-LG 550	Long 300 Std 180 Fast 80	110	-40 to +70°C	R2	NF-DK66
		Free cut  91.0 × 2  91.0 × 2  12  2000	7-EL 1,200 6-UL 750 5-PL 650 4-LG 550	Long 300 Std 180 Fast 80	110	-40 to +70°C	R2	NF-DK67
Diffuse type	M6	Nut type, Free cut  Lens: PC	7-EL 550 6-UL 330 6-PL 230 4-LG 200 3-ST 150 2-FS 90 1-HS	Long 65 8td 45 Fast 10	15	-40 to +70°C	R2	NF02-DK
	ø3	Free cut  91.0 × 2 93 91.3 91.3	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
		Coaxial, Free cut  Detecting part detail Receiving: 00.265 × 9  2.7 Screwing side Emitting: 00.5 × 151) × 1  Quite State	7-EL 270	Long 120 Std 70 Fast 35	55	-40 to +60°C	R2	NF-DR11

<sup>●</sup>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.

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

### **Retro-reflective type**



Fiber amplifier

D3RF

P.110





## 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)





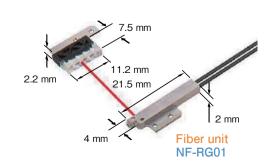
#### Wafer mapping with retro-reflective type

#### 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.



Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

1 10/11010 111/1112

#### 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

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

T	F	Sensing di	stance (mm)		Ambient	Bending radius	Model
Туре	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
Built-in polarizing filter	Glass lens (BK7)  Diagram for attaching the included mounting bracket  Glass lens (BK7)  15, 2000  16, 6 10, 2 4 10, 20, 20, 20, 20, 20, 20, 20, 20, 20, 2	7-EL 1,390 6-UL 1,300 5-PL 1,140 4-LG 990 3-ST 6440 2-FS 520 1-HS 260	Long 850 850 750 Fast 10 to 550	600	-25 to +55°C	R1	NF-RRO1
Narrow view	Side ON, Free cut  25  2000  2-R1.25  3	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	NF-RB02
Wafer mapping	Ultra-small type, Free cut  Detecting part detail  15.8  0.5 x 1  14.7 - 0.2  1.45 x 0.15  1.9 x 0.05  2-M1.4 x 0.3 threaded  Mounting part (SUS)  Base (ABS)  Reflector (acrylic)  Head block (SUS)  Prism  1.9 x 0.05  1.1.2 x 0.05  Reflector (acrylic)  Head block (SUS)  Prism  1.9 x 0.05  1.1.5 x 0.05  1.1.5 x 0.05  2-M1.4 x 0.3 threaded  Receiving side  Receiving side	7-EL 590 6-UL 550 5-PL 480 4-LG 420 3-ST 270 2-FS 180 1-HS	Long 350 8td 230 Fast 230	Unusable	-40 to +60°C	R10	NF-RG01 Ultra-thin

<sup>●</sup>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.

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

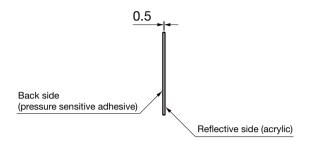
through-beam type

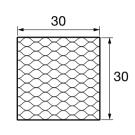
Correct use

#### Fiber units Retro-reflective type

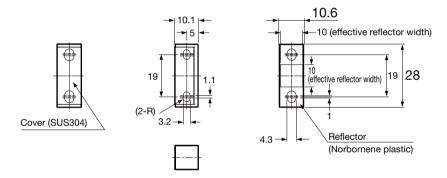
#### **Reflector dimensions**

■ DG3030 (NF-RR01 included reflective sheet)

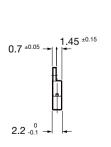


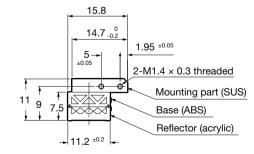


■ P31 (NF-RB02 included reflector)



■ NF-RG01 included reflector







## 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 Ø0.125 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 Ø0.2 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 Ø0.9 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 ø0.125 mm Fine core

The NF-TP01 through-beam type and the NF-DP01 diffuse type use a Ø0.125 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: ø0.125 mm



NF-DP01 Fine core diameter: ø0.125 mm (4 cores)



#### Photoelectric Sensors

Specialized Photoelectric Sensors

Laser Displacement Sensors

#### Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

D 1 (1 1)

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

through-beam type

Correct use

### 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

# Small object detection lens (for diffuse type fibers)

Туре	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  Straight knurl  64  64  65  16	Approx. ø0.2 mm: NF-DK21 Approx. ø0.4 mm: NF-DT01 (ø0.005 mm metal wire)	7 mm	-20 to +60°C	NF-DA03
Small objec	Housing: aluminum (black alumite) Lens : glass  15  04  Inner thread M3 × 0.5	Approx. ø0.3 mm: NF-DK21 Approx. ø0.5 mm: NF-DT01 (ø0.005 mm metal wire)	7.5 mm	-40 to +70°C	NF-DA04
	Lens diameter: e3.3	Approx. ø0.5 mm: NF-DM02 (ø0.005 mm metal wire)	6 mm	-40 to +70°C	NF-DA05
Small spot lens	Lens diameter: ø3.0  ø4.3  Aluminum (black alumite)  M3 × 0.5 depth 3.4  6.8  Straight knurl	Approx. Ø0.2 mm: NF-DK21 (Ø0.005 mm metal wire) Approx. Ø0.4 mm: NF-DT01 (Ø0.01 mm metal wire)	6 mm	-40 to +70°C	NF-DA01
	Lens diameter: ø3.0  o4.3  Aluminum (black alumite)  M3 × P0.5 depth 3.4  Straight knurl	Approx. ø1.2 mm: NF-DK21 (ø0.005 mm metal wire) Approx. ø1.4 mm: NF-DT01 (ø0.01 mm metal wire)	15 mm	-40 to +70°C	NF-DA02
Spot size Adjustable lens	27.1 20 4.5  o7.1  Inner thread M4 × 0.7 depth 6  Housing: aluminum (black alumite) Lens : glass	Approx. Ø0.9 to 1.9 mm: NF-DM02-G4 (Ø0.2 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. ø0.8 to 3.2 mm: NF-DM02-G4 (ø0.1 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 Sough

### 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

through-beam type

Correct use

# Small object detection fiber units (through-beam type)

Tv	ре	Features/dimensions (mm)	Sensing distance Parentheses indicate of	lia. of the smallest dete	ctable object Unit: mm	Ambient	Bending radius	Model
ıy	pe	reatures/diffierisions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Wiodei
	ø1	Flexible 500  6   Set screw installing range  35   18.3	7-EL 54 6-UL 50 6-PL 44 4-LG 38 9-ST 25 2-FS 15 1-HS 5 (e0.02 metal wire)	Long 30 Std 18 Fast 8 (o0.02 metal wire)	10 (e0.02 metal wire)	-40 to +60°C	R4	NF-TRO4
iype	ø1.5	Flexible, Free cut  00.25 fiber (4)  0	7-EL 850 275 6-UL 2-FS 150 5-PL 1-HS 450 4-LG (00.1 metal wire)	Long 350 Std 200 Fast 90 (ø0.1 metal wire)	110 (ø0.1 metal wire)	-40 to +70°C	R4	NF-TRO3
Through-beam type		## Online	7-EL 900 2-55 140 5-50 14-0 4-0 4-0 350 (0.1 metal wire)	Long 350 Std 200 Fast 90 (ø0.1 metal wire)	120 (ø0.1 metal wire)	-40 to +70°C	R15	NF-TM03
Thre		o0.5 sleeve: 5 mm long, Free cut  o0.5 SUS o3 SUS o3 SUS 5 15 2000	7-EL 1700 3-ST 50 6-UL 2-FS 1100 25-FPL 1-HS 80 4-LG 70 (00.1 metal wire)	Long 80 Std 40 Fast 20 (ø0.1 metal wire)	30 (ø0.1 metal wire)	-40 to +70°C	R15	NF-TT01
	ø3	00.25 fine sleeve: 5 mm long  5	7-EL 27 6-UL 25 5-PL 21 4-LG 18 3-ST 12 2-FS 7 1-HS 2 (o0.02 metal wire)	Long 6 Std 3.5 Fast 2 (e0.02 metal wire)	1 (e0.02 metal wire)	-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.
- ●The values for the smallest detectable object are typical values when set for the best to detect small objects on the fiber amplifier side.

# Small object detection fiber units (diffuse type)

Туре	Fretunes/dimensions /	Sensing distance Parentheses indicate d	ia. of the smallest detec	table object Unit: mm	Ambient	Bending radius	Model
Type	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	wodei
edá espino	00.5 sleeve: 3 mm long  00.5 sleeve: 3 mm long  00.5 sleeve: 3 mm long  1000	7-EL 28 6-UL 26 5-PL 23 4-LG 20 3-ST 13 2-FS 3 1-HS 1 (ø0.02 metal wire)	Long 18 Std 5 Fast Unusable (e0.02 metal wire)	3 (o0.02 metal wire)	-40 to +60°C	R10	NF-DP01 Fine core

- ullet The sensing distances for the diffuse type fiber units are values on 500  $\times$  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.
- ●The values for the smallest detectable object are typical values when set for the best to detect small objects on the fiber amplifier side.

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

# Screen/Array



D3RF
P.110





# Fiber units for detecting with light screen

Optimal 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.





## 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  $2 \times 15$  mm (at a distance of 15 mm). Optimal for the detection of workpieces with complex shapes and drilled workpieces such as lead frames.



# 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.

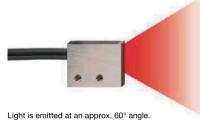
Able to detect finer light differences than array fibers as a through-beam type due to collimated light.



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.



### Photoelectric Sensors

Specialized Photoelectric Sensors

Laser Displacement **Sensors** 

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

_	<b>-</b>	Sensing di	stance (mm)		Ambient	Bending radius	
Type	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
	11 mm wide screen, Flexible, Side ON, Free cut    R   Light axis center	7-EL 3,700 6-UL 3,000 5-PL 3,000 4-LG 3,000 4-LG 2,500 2-FS 2,500 1-HS 1,500	Long 3,500 Std 2,500 Fast 1,800	2,500	-40 to +70°C	R2	NF-TZ10 Renewal Collimated light
Through-beam type	11 mm wide screen, Flexible, Side ON, Free cut    B   Light axis center	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-TZO9  Renewal  Collimated light
	32 mm wide screen, Flexible, Side ON, Free cut  Light axis Fiber #0.75 x 1 core (PMMA), sheath #0.1.3 (PE)  Window (3.2 x 32), lens (norbornene plastic)  65 4 2000  (19) Light Housing PO 15.2 o1.3 o1.3  2-03.2 06 countersinking (both sides)	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	R2	NF-TZ08 Renewal Collimated light

<sup>●</sup>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.

# **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

through-beam type

Correct use



## 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

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

Туре	Features/dimensions (mm)	Sensing di	stance (mm)		Ambient	Bending radius	Model
Турс		D3RF	D2RF	BRF	temperature	(mm)	Wiodei
	32 mm wide screen, Flexible, Side ON, Free cut  Light axis Fiber: o1 × 1 core (PMMA), sheath o1.3 (PE)  Window (3.2 × 32), lens (norbornene plastic)  65 2000  (19) Light Husing PO 5.2 axis, respectively. 16.2 axis, respectively. 2 axis, respe	7-EL 3,700 6-UL 3,700 5-PL 3,700 4-LG 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-TZO7 Renewal Collimated light
	40 mm wide screen, Flexible, Side ON, Free cut 40 5.1 3 22.3 Light axis Housing (ABS) 69.3 2000 69.3 2000 7.65 name tube Mounting part: SUS316L 2-3.2 × 6.2 mounting hole 6 × 9 countersinking 1 (both sides)	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 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]
Through-beam type	Housing (Brass with nickel plating)  Array fiber part (e0.265 × 16)  3 -M3 × 0.5 threaded  Read ON, Free cut  15  2000  (e3.2) Protective tube (polyolefin)  22.2	7-EL 1,350 6-UL 1,260 5-PL 1,170 4-LG 990 3-ST 660 2-FS 400 1-HS	Long 650 Std 400 Fast 250	300	-40 to +70°C	R25	NF-TZ05
	5.25 mm wide array, Side ON, Free cut  Array fiber part (e0.265 × 16)  Housing  (Brass with nickel plating)  15  2000  3 -M3 × 0.5 threaded  2.5 (6.5)	7-EL 1,440 6-UL 1,350 5-PL 1,170 4-LG 1,080 3-ST 710 2-FS 430 1-HS	Long 650 Std 400 Fast 250	300	-40 to +70°C	R25	NF-TZ06
	5.25 mm wide array, Head ON, Free cut    1	7-EL 4,000 650 6-UL 2-FS 330 5-PL 1-HS 1,000 4-LG 900	Long 800 Std 500 Fast 250	330	-40 to +70°C	R25	NF-TS10
	10.5 mm wide array, Head ON, Free cut  BSBM brass M3 × P0.5 2-e2.2  Array fiber part  25 10 10 5 2000  with an ambient humidity between 35 and 85%. In the case of 88	7-EL 4,000 6-UL 2-FS 1,600 330 1-HS 100 4-LG 900	Long 800 Std 500 Fast 250	330	-40 to +70°C	R25	NF-TS14

<sup>•</sup>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.

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

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

Туре	Features/dimensions (mm)			stance (mm)		Ambient temperature	Bending radius	Model
	13 mm wide array, Head ON, Detecting part detail e0.265 fiber (16) 0.7 0.35	7-EL 4,( 6-UL 1,5 5-PL	000 500	Long	BRF	Comportation	(mm)	
Through-beam type	2.5   1.2 1.3 1.2   1.3 1.	4-LG 1,2 3-ST 8 2-FS 4 1-HS	200 300 400	850 Std 500 Fast 250	350	-40 to +70°C	R25	NF-TS28
Through-	30 mm wide array, Head ON, Free cut  Detecting part detail 33  1.5  Head material BSBM  20  16.5  02.2  33  25  2-M3 P=0.5 through 5  2000	6-ÜL 1,2 5-PL 1,2 4-LC 1,0 3-ST 2-FS	000 400 200 000 700 800	Long 650 Std 500 Fast 250	200	-40 to +70°C	R25	NF-TS19
	Screen Head ON, Free cut  Detecting part detail  Emitting side:    Continue   Continue   Continue	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
уре	Array, Head ON, Free cut Housing (Brass with nickel plating)  10.85  Array fiber part (00.265 × 32)  3-M3 × 0.5 threaded	7-EL 600 6-UL 560 5-PL 490 4-LG 430	3-ST 270 2-FS 2-FS 270 1-HS 51	Long 320 Std 170 Fast 85	130	-40 to +70°C	R25	NF-DZ02
Diffuse type	Array, Side ON, Free cut  Array fiber part (e0.265 × 32)  Housing (Brass with nickel plating)  (e3.2) Protective tube (polyolefin) × 2  3 -M3 × 0.5 threaded  15 2.5 2.5 (8)	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  Detecting part detail  1.125  3  4  4  Socket diameter 2-02.2 Core diameter 16-00.25 10-03.5	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

- ullet The sensing distances for the diffuse type fiber units are values on 500  $\times$  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.

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

# Limited diffuse reflective type









# Detection at a limited distance for mapping and alignment

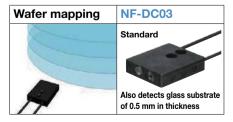
Most number of models in the industry with 14 total models

# **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	NF-DN02
1	Low cost	Standard	Heat resistant to 180°C	Heat resistant to 300°C	Vacuum resistant/heat resistant to 300°C





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



# General-purpose use

Three general-purpose models are available





NF-DC39 (Flat ON)



Cap orientation detection





Hoop existence detection



Wafer notch detection



Photoelectric Sensors

Specialized Photoelectric Sensors

Laser Displacement Sensors

# Limited diffuse reflective type fiber units (glass substrate detection)

-		Factorial discountries	Sensing	distance (mm)		Ambient	Bending radius	Mandal
ly	/pe	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
		Alignment, Free cut  29  3000  18  18  6.5 2 -M3 flush screw hole  22.2 × 2  23.5  Emitting/receiving part  1 Detection direction  4.5  Housing (heat resistant p1 × 1)  Receiving fiber (neat resistant p1 × 1)  ABS)  Receiving fiber (neat resistant p1 × 1)	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
Glass substrate detection	Flat ON	Alignment, Flexible, Free cut  Detecting part detail  Emitting/ 29	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	Ung 0 to 23 Std 0 to 17 Fast 0 to 12	15	0 to +70°C	R4	NF-DC06
3		Alignment, Flexible, Free cut  Detecting part detail Emitting/receiving fiber o0.25 × 9  3000  18  2.5 → 18  6.5 2 -M3 flush screw hole o1.3 × 2  Emitting/receiving part 10  3.8 Detection Housing 1 direction (heat resistant ABS)	7-EL 0 to 38 6-UI 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 O to 36 Std O to 30 Fast O to 15	Unusable	0 to +70°C	R4	NF-DC04

<sup>●</sup>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.

# 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

through-beam type

Correct use

## 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

through-beam type

Commont

## Correct use

# Limited diffuse reflective type fiber units (glass substrate detection)

Τv	ре	Features/dimensions (mm)	Sensing dis			Ambient	Bending radius	Model
·y	P.	Alignment, Heat resistant to 250°C	D3RF	D2RF	BRF	temperature	(mm)	WOUCI
		Mounting holes 33.2 3000 Mounting holes 21.7 6.5 Gridery Socrews 35.2 17.9 Gridery Socrews 35.2 17	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  Mourting loces 34.5 5.5 Company 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	7-EL 2 to 45 6-UL 3 to 40 5-PL 3 to 39 4-L6 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
tection		Existence detection, Free cut Housing (polycarbonate)  12 12 18 3.5 30  4 6 17 18 2000	7-EL 0 to 12	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
Glass substrate detection	Flat ON	Existence detection, Free cut  21 2000 9.5 Housing (heat resistant ABS) 24 16  Emitting/receiving part  2 -M3 flush screw hole  Detecting axis	7-EL 3 to 16 6-UL 3 to 14 5-PL 4 to 14 4-US 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  2000  10.75  10.	7-EL 0 to 35 6-UL 0 to 28 5-PL 0 to 25 4-UG 0 to 22 3-ST 0 to 20 2-FS 0 to 9 1-HS 3 to 4	Long O to 20 Std O to 10 Fast O to 8	10	-60 to +180°C	R25	NF-DH08
		Existence detection, Heat resistant to 300°C  7 20 2000  10.75 6.5 94 02.9 16.7 T8.3 96 02.2 × 2  Detecting part detail 4	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

### 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

# Limited diffuse reflective type fiber units (glass substrate detection)

-		<b>-</b> . ,,, .	Sensing di	stance (mm)		Ambient	Bending radius	
ıy	ре	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
Glass substrate detection	Flat ON	Existence detection, Heat resistant to 300°C, Vacuum resistant 3000    10.75	7-EL 0 to 22 6-UL 0 to 12 5-PL 0 to 11 4-LG 0 to 9 3-ST 0 to 7 2-FS 3 to 4 1-HS Unusable	Long O to 8 Std 2.5 to 5 Fast Unusable	3	-30 to +300°C	R18	NF-DN02
	Head ON	Mapping, Free cut  Detecting part detail Emitting/receiving fiber o1.5 x 1  30  4000  02.2 x 2  (ABS)  25  (B)  (Ca3.2) Model name tube (PVC)  (Ca3.2) Model name tube (PVC)	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

<sup>●</sup>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)

_			Sensing di	istance (mm)		Ambient	Bending radius	Madel
17	ре	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
	Flat ON	Free cut  2-03.2 Housing (polycarbonate)  01 × 2 Model name tube  12	7-EL 1.5 to 4 6-UL 0 to 4 5-PL 0 to 4 1-HS 0 to 4	Long 0 to 4 Std 0 to 4 Fast 0 to 4	0 to 4	-40 to +60°C	R10	NF-DC39 Low cost
General-purpose	Head ON	Free cut  6  18  2000  18  2000  18  18  18  18  18  18  18  18  18	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	Long 4.5 to 11 8td 4.5 to 10 Fast 4.5 to 10	6	-40 to +70°C	R10	NF-DC09
eg	Flat ON	Ultra-small, Flexible, Free cut  1000  1.5  7  1.2  1.3  1.7  1.7  1.7  1.7  1.7  1.7  1.7	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	Long 1 to 7 Std 1 to 5.5 Fast 1 to 3	3	-20 to +60°C	R1	NF-DC08

ullet The sensing distances for the diffuse type fiber units are values on 500  $\times$  500 mm white paper.

<sup>●</sup>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.

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

through-beam type

Correct use

# Narrow view/wafer mapping



D3RF





# 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

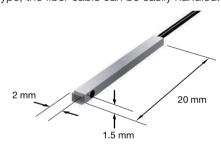
Ultra-narrow view which restricted the spread of light to the limit. Optimal for wafer mapping due to a design that minimizes light leakage.

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



# 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.



Diffuse type and limited diffuse reflective type are also available Diffuse type NF-DR09 Limited diffuse reflective type

NF-DC03







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

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

	Time	Features/dimensions (mm)	Sensing dis	Ambient	Bending radius	Model		
Type		reatures/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	iviodei
Through-hosm type	<u> </u>	2° aperture, Free cut (Screw installing range) Detecting 20 2000 part (e2.2) 8 - (20)  63.5 (polycarbonate) 63.7 (SUS)	7-EL 3,600 2-,100 2-,100 5-,PL 3,600 1-1-HS 790 4-LG 3,200	3,000 Std 2,000 Fast 1,300	2,300	-40 to +60°C	R25	NF-TG01  (Ultra-narrow view)

<sup>●</sup>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)

		Sensina di	stance (mm)		Ambient	Bending radius	
Type	Features/dimensions (mm)	D3RF	D2RF	BRF		(mm)	Model
1.5 × 1.5	2.5° aperture, Heat resistant, Free cut Rod prism: SUS303 Lens: Glass (BK7) or PC  2.3	7-EL 2,300 600 6-UL 1,200 300 5-PL 1,100 4-LG 950	Long 600 Std 300 Fast 100	200	-40 to +105°C	R10	NF-TS25
2 × 1.5	3° aperture, Free cut  Prism  Light axis Mounting base surface 20 2000  Detecting part detail 1.5 å laight (0.5) (20)  1.7 SUS  Detecting part (at) 2.8 (20)  Polycarbonate	7-EL 1,000 6-UL 900 5-PL 790 4-LG 690 3-ST 450 2-FS 260 1-HS	Long 500 Std 300 Fast 150	220	-40 to +60°C	R10	NF-TG04  Ultra-thin
Side view Through-beam type	2° aperture, Free cut  (Screw installing range)  25  2000  2000  3.7 Light SUS o4 (PVC) Polycarbonate Detecting part (o2.5)	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-UG 3,300 3-ST 2,100 2-FS 1,780 1-HS 510	Long 2,500 Sld 1,600 Fast 800	900	-40 to +60°C	R25	NF-TG03 (Ultra-narrow view
Mein epis	2° aperture, Flexible, Free cut  25 2000  3.7 25 2000  3.7 25 2000  3.7 25 2000  Detecting part detail of part detail of part detail of 20.075 × 151  Tip bracket (SUS)  04 (PVC)	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-UG 3,300 3-ST 2,1100 2-FS 1,500 1-HS 520	Long 2,500 Std 1,600 Fast 800	1,000	-40 to +60°C	R1	NF-TGO2 (Ultra-narrow view
	5° aperture, Free cut e0.75 fiber (1) Mounting bracket (SUS) included  Detecting part detail  1.3 3 17.6 4 3.6 3.0 10 2000	7-EL 4,000 2,800 6-UL 2,800 5-PL 2,000 5-PL 4,000 1,000 4-LG 3,000	Long 4,000 Std 3,000 Fast 2,000	1,700	-40 to +70°C	R25	NF-TS12
	3° aperture, Free cut Detecting part detail  1.3 2.8 3° aperture, Free cut Rod prism (BK7) Lens (BK7) SUS303 01 30 2000	7-EL 3-ST 4,000 6-UL 2-FS 4,000 1,000 1,000 4-LG 300 4-LG 300 4-LG 300 4-LG 4,000	Long 3,000 Std 1,600 Fast 700	750	-40 to +70°C	R25	NF-TS22

<sup>•</sup>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.

through-beam type
Correct use

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

through-beam type

Correct use

# Narrow view/wafer mapping fiber units (retro-reflective type/diffuse type/limited diffuse reflective type)

Ty	ре	Features/dimensions (mm)	Sensing dis			Ambient	Bending radius	Model
		Wafer mapping, Ultra-small type, Free cut	D3RF	D2RF	BRF	temperature	(mm)	
Retro-reflective type	4 × 2	15.8  14.7  1.95  2-M1.4 × 0.3 threaded Mounting part (SUS) Base (ABS) Reflector (acrylic) Prism Prism 197.5  8  2000 Mark band Emitting side) (Receiving side) 0.7  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1	7-EL 590 6-UL 550 5-PL 480 4-LG 420 3-ST 270 2-FS 180 1-HS	Long 350 Std 230 Fast 130	Unusable	-40 to +60°C	R10	NF-RG01 Ultra-thin
Diffuse type	Square	Long range detection, Flexible, Free cut  Detecting part detail  Multi core fiber 90.075 × 151  Glass lens (BK7)  9.5  Housing (SUS)  9.5  15  2000  Diagram for attaching the included mounting bracket  Glass lens (BK7)  9.5  10  11  12  11  11  11  11  11  11  11	7-EL 1,070 6-UL 990 5-PL 880 4-IG 770 3-ST 500 2-F6 310 1-H6	Long 600 Std 380 Fast 200	250	-40 to +60°C	R1	NF-DR09
He Limited diffuse reflective type	Square	Possible to detect object even at a thickness of Emitting/receiving fiber #1.5 x 1  Detecting part detail  Detecting part detail  Housing (ABS) 4000  ### 4000  ### 6.5 (20)  ### 4000  ### 6.5 (20)  ### 4000  ### 6.5 (20)  ### 4000  ### 6.5 (20)  ### 4000  ### 6.5 (20)  ### 4000  ### 6.5 (20)  ### 4000  ### 6.5 (20)  ### 4000  ### 6.5 (20)  ### 4000  ### 6.5 (20)  ### 4000  ### 6.5 (20)  ### 4000  ### 6.5 (20)  ### 4000  ### 6.5 (20)  ### 4000  ### 6.5 (20)  ### 4000  ### 6.5 (20)  ### 6.	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.

# Heat resistant (130°C or below)

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



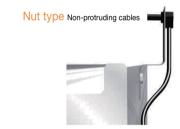
# Fiber units for ambient temperatures of 130°C or below

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 conveyer side, no extra space is needed. Also, they eliminate worries regarding cable breakage caused by snagging on tools during work.





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 Sleeve length 25 mm Sleeve length 10 mm 15 mm

### 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

# Glass substrate

### 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

through-beam type

Correct use

### 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)

	T	Factorial disconstants	Sensing dis	stance (mm)		Ambient		Model
	Туре	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
		Nut type, Free cut  10.5 2000 7 44.4 P-0.7 3.5 Polyamide (PA6)	7-EL 2,000 6-UL 1,100 5-PL 1,000 4-UG 900 3-ST 600 2-FS 300 1-HS	Long 750 Std 500 Fast 170	300	-40 to +105°C	R25	NF25-TH Space-saving
C	105°	Side view, Free cut  1.3 2.8 3.6 BK7 SUS303 e1 Detecting part detail	7-EL 3,500 1,200 6-UL 2,300 6-UL 2,000 4-LG 170 170 170 170 170 170 170 170 170 170	Long 1,300 Std 700 Fast 400	500	-40 to +105°C	R10	NF-TS22M
Through the month		Narrow view, Side view, Free cut  Rod prism: SUS303 Lens: Glass (BK7) or PC SUS303 o1 20 2000  Detecting part detail	7-EL 2,300 600 600 2-FS 1,200 5-PL 1+HS 1,100 4-LG 950	Long 600 Std 300 Fast 100	200	-40 to +105°C	R10	NF-TS25
F		o1 sleeve: 25 mm long and 10 mm long, 45° angle light axis, Heat resistant, Free cut  2.2	7-EL 100 6-UL 55 5-PL 50 4-LG 4-LG 40 3-ST 30 2-FS 10 1-HS	Long 28 Std 20 Fast 15	16	-40 to +105°C	R10	NF-TH06
	100°0	Lens attachable (P.98), Free cut  M4 × P0.7  (brass with nickel plating)  91 fiber (1)  M2.6 × P0.45  3 12 2000	7-EL 2,400 700 2-FS 1,400 300 5-PL 1,000 4-LG 900	Long 700 Std 400 Fast 200	300	-40 to +100°C (Note)	R25	NF-TH01

•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.

### 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 (diffuse type)

т.,		F	Sensing dis	stance (mm)		Ambient	Bending radius	Model
Ту	pe	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
e type	105°C	Free cut  12 2000  10 2.4 6.8  6.8  Lens: PC M6 P=1.0  Polyamide (PA6)	7-EL 650 6-UL 350 5-PL 280 4-LG 240 3-ST 175 2-PS 100 1-HS 25	Long 120 Std 80 Fast 25	15	-40 to +105°C	R25	NF25-DH (Space-saving)
Diffuse type		Free cut	7-EL 950 2-F8 250 2-F8 130 1-H8 400	300 300 Std 180 Fast 80	160	-40 to +105°C	R25	FD-3SD1(100) Standard item
	100°C	Free cut  02.5 SUS  06.5 FO.75 SUS  06.2 PO.75 SUS  06.2 PO.75 SUS  06.2 PO.75 SUS  07.7 SUS  07	7-EL 850 6-UL 275 5-D 170 5-PL 450 4-LG 375	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 x 20 mm (ø50 mm reflective surface)

Glass bottle detection under high temperatures



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

through-beam type

Correct use

# Heat resistant (180 to 200°C)



Fiber units Heat resistant P.77







# 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	
The same of the sa		36			
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						
Ordinary temperature fiber section is free cut						

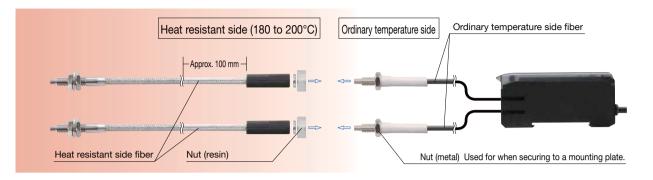
Diffuse type	
Coaxial	Standard
NF-DH07	NF-DH01
Heat resistant to 200°C	Heat resistant to 200°C
Metal sheath	Free cut

### Limited diffuse reflective type





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)

Time	Frahwas/dimensions (	Sensing (	distance (mm)		Ambient	Bending radius	Madel
Туре	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
	Lens attachable (P.98)  3 20 1000  Healtheaing Ordinary temperature resistant side side 150 35 of 1.6 18.3 of 1.6	7-EL 570 6-UL 540 6-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
Through-beam type	Lens attachable (P.98)  M2.6 × 0.45  3.5  150  150  150  16.7 18.3  Multipatric Security Secu	7-EL 1,350 6-UL 1,260 5-PL 1,130 4-LG 990 3-ST 630 2-F8 360 1-HS	Long 750 Std 450 Fast 220	280	-60 to +200°C	R25	NF-TH11 Standard item
Throi	Lens attachable (P.98), Heat resistant side: 200 mm long Only the ordinary temperature side is free cut  23 200 10 10 10 10 10 10 10 10 10 10 10 10 1	7-EL 1,080 6-UL 990 5-PL 900 4-LG 790 3-ST 510 2-FS 290 1-HS	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.

Photoelectric

Specialized Photoelectric Sensors

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

### 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

through-beam type

Correct use

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

Tv	ре	Features/dimensions (mm)	Sensing dis			Ambient	Bending radius	Model
ıy	Pe		D3RF	D2RF	BRF	temperature	(mm)	WIDGE
		Heat resistant side: 300 mm long, Only the ordinary temperature side is free cut  23 300 5 <sup>25</sup> 2.5   Heat/freezing Ordinary temperature   Joint bracket (brass with nickel plating)    M2.6 x 0.45   Heat/freezing Ordinary temperature   Joint bracket (brass with nickel plating)    M4 x 0.7   Width across 15.4   Lock nut (polycarbonate)    Vidth across flats 7 thickness 3.2   Joint bracket (brass with nickel plating)    Width across flats 7 thickness 3.2   Joint bracket (brass with nickel plating)    Width across flats 7 thickness 3.2   Joint bracket (brass with nickel plating)    Width across flats 7 thickness 3.2   Joint bracket (brass with nickel plating)    Width across flats 7 thickness 3.2   Joint bracket (brass with nickel plating)    Width across flats 7 thickness 3.2   Joint bracket (brass with nickel plating)    Width across flats 7 thickness 3.2   Joint bracket (brass with nickel plating)    Width across flats 7 thickness 3.2   Joint bracket (brass with nickel plating)    Width across flats 7 thickness 3.2   Joint bracket (brass with nickel plating)    Width across flats 7 thickness 3.2   Joint bracket (brass with nickel plating)    Width across flats 7 thickness 3.2   Joint bracket (brass with nickel plating)    Width across flats 7 thickness 3.2   Joint bracket (brass with nickel plating)    Width across flats 7 thickness 3.2   Joint bracket (brass with nickel plating)    Width across flats 7 thickness 3.2   Joint bracket (brass with nickel plating)    Width across flats 7 thickness 3.2   Joint bracket (brass with nickel plating)    Width across flats 7 thickness 3.2   Joint bracket (brass with nickel plating)    Width across flats 7 thickness 3.2   Joint bracket (brass with nickel plating)    Width across flats 7 thickness 3.2   Joint bracket (brass with nickel plating)    Width across flats 7 thickness 3.2   Joint bracket (brass with nickel plating)    Width across flats 7 thickness 3.2   Joint bracket (brass with nickel plating)    Width across flats 7 thickness 2.2   Joint bracket (brass with nick	7-EL 1,080 6-UL 990 5-PL 900 4-U 790 3-ST 510 2-FS 290 1-HS 90	Long 550 Sid 350 Fast 170	220	-60 to +200°C	Heat resistant side R18 Ordinary temperature side R25	NF-TH13
Through-beam type	200°C	Heat resistant side: 500 mm long, Only the ordinary temperature side is free cut  23 500 5°25  12 1	7-EL 1,080 6-UL 990 5-PL 900 4-LG 790 3-ST 510 2-PS 290 1-HS	Long 550 Std 350 Fast 170	220	-60 to +200°C	Heat resistant side R18 Ordinary temperature side R25	NF-TH14
		Side-view, Heat resistant side: 500 mm long, Only the ordinary temperature side is free cut  24	7-EL 900 6-UL 870 6-PL 760 4-L6 660 3-ST 430 2-FS 260 1-HS 80	Long 500 Std 300 Fast 150	150	-60 to +200°C	Heat resistant side R18 Ordinary temperature side R25	NF-TH15

<sup>●</sup>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 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 (through-beam type)

Tv	ре	Features/dimensions (mm)	Sensing dis	stance (mm)		Ambient	Bending radius	Model
ıy	PC		D3RF	D2RF	BRF	temperature	(mm)	Wiodei
Through-beam type		Side-view, Heat resistant side: 800 mm long, Only the ordinary temperature side is free cut  24 800 50  Heat/recing Ordinary temperature side brass with nickel plating) 33.8 Light 44 (100) 9.3  a2.7 liner + blade tube (SUS)  24 785 50  Accordinary temperature side is free cut brass with nickel plating)  33.8 Light 44 (100) 9.3  a3.5  back nut (polycarbonate)  24 785 50  Accordinary temperature brass with nickel plating)  25.8 2000  Prism (BK7)  Holder Brass with nickel plating)  Spring washer (SUS)  Width across flats 7 Fiber core of 1 × 1 core (acrylic) sheath o2.2 (polyrethylene)	7-EL 900 6-UL 870 5-PL 760 4-LG 660 3-ST 430 2-FS 260 1-HS 80	Long 500 Std 300 Fast 150	150	-60 to +200°C	Heat resistant side R18 Ordinary temperature side R25	NF-TH16
	200°C	01 sleeve: 27 mm long, Side view  1.75 1 1.5 1  (SUS)  Heat/heering resistant side -40°C to 200°C Ordinary temperature side  (SUS)  (SUS)  (SUS)  (SUS)  (O1.6) 03 Note 2  02.2  04 27±1 12±0.5 140 200 6±1 15 × 1	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)
Thro		01.5 sleeve: 25 mm long, Side view  1.75  Heat/freezing resistant side temperature side  01.5 (SUS)  03 (SUS)  150  03 (SUS)  150  04 (1.5 (SUS)  05 (SUS)  06 (SUS)  150  07 (SUS)  08 (SUS)  150  09 (SUS)  09 (SUS)  150  00 (SUS)  01.5 (SUS)  02.2  03 (SUS)  04 (SUS)  05 (SUS)  06 (SUS)  06 (SUS)  07 (SUS)  08 (SUS)  09 (SUS	7-EL 1,600 6-UL 850 5-PL 800 4-LG 600 3-ST 400 2-FS 200 1-HS 60	Long 350 Std 250 Fast 150	150	-40 to +200°C	R30	NF-TH05S-A (Made-to-order products)
		O1 Sleeve: 8 mm long, Side view  Detecting part detail 1.75 THE Fibre and surface  Light axis 90° SUS 90.9 SUS 1.5 SUS 90° SUS	7-EL 300 6-UL 160 5-PL 150 4-LG 100	Long 125 Std 60 Fast 30	50	-40 to +200°C	R50	NF-TH07
	180°C	Free cut  01.5 × 1  17  2000	7-EL 4,000 8-ST 1,000 2-FS 550 5-PL 1,700 180 4-LG 1,500	Long 1,000 Std 700 Fast 350	600	-40 to +180°C (Note)	R35	NF-TH02 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. Note: Light intensity retention rate of 85% or above after 1000 continuous work hours.

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)

т.	ma	Footures (dimensions ()	Sensing dis	stance (mm)		Ambient	Bending radius	Model
13	ype	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Wodei
Diffuse type	200°C	Coaxial, Metal sheath  1000  27  30  60  35  167 183  Peaving side indication tube  28.5 (SUS)  Emitting: e50 µm x 440  Width across flats 7 thickness 2.4 (SUS)	7-EL 1,280 6-UL 1,200 5-PL 1,050 4-LG 920 3-ST 600 2-FS 230 1-HS	Long 850 Std 320 Fast 100	200	-60 to +200°C	R25	NF-DH07
	180°C	od.5 fiber (2)  od.5 fiber (2)  od.9 M6 × P0.75 SUS  od.2 od.2  od.9 M6 × P0.75 SUS  od.2 od.2  od.3 od.4 od.4 od.4 od.4 od.4 od.4 od.4 od.4	7-EL 1,100 6-UL 840 300 5-PL 750 4-LG 650	Long 450 Std 250 Fast 150	210	-40 to +180°C (Note)	R35	NF-DH01

- •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)

Time	Frahuss/dimensions/	Sensing dis	Sensing distance (mm)			Bending radius	Model
Туре	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
Limited diffuse reflective type	Glass substrate detection, Free cut  2000  10.75  19  8  10.75  19  10  10  10  10  10  10  10  10  10	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

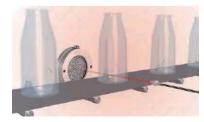
•Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C. Note: Light intensity retention rate of 85% or above after 1000 continuous work hours.

# 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



# Heat resistant (250 to 350°C)



# 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
ADDRESS TO THE PARTY OF THE PAR	

# 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			

### Specialized Photoelectric

Photoelectric Sensors

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

## 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

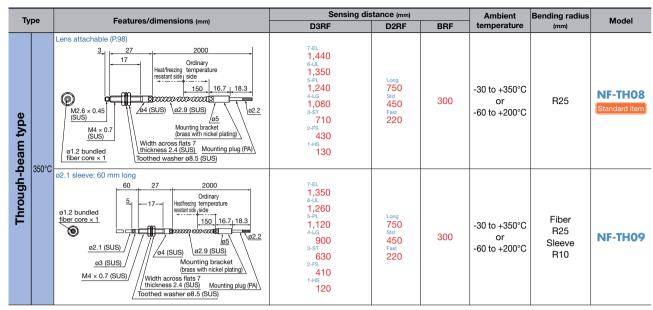
Liquid level/liquid leakage/ water detection

Lens for through-beam type

Courseline

## Correct use

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



●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)

-	Timo	Features/dimensions (mm)	Sensing dis	stance (mm)		Ambient	Bending radius	Model
	Туре	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
Diffuse type	350	Coaxial  Heat/freezing Ordinary temperature resistant side side  Detecting part detail  Receing: Iner denete of 1.8, and a color denete of 2.9, bunded fiber core x 1  17  150  30  60±5  16.7  18.3  20  000  000  001  001  002  002  003  003	7-EL 940 6-UL 890 5-PL 770 4-LG 670 3-ST 440 2-FS 190 1-HS	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.

# Photoelectric Control

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

			Sensing dis	stance (mm)		Ambient	Bending radius	Model
Ту	pe	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
Diffuse type	350°C	02.1 sleeve: 90 mm long  90 27 1000  Bendable range Detecting part detail Receiving: 10 02.9 95 Plastic plug 050 µm x 380  Width across flats 7 thickness 2.4 (SUS)  M4 x 0.7 (SUS)	7-EL 1,110 6-UL 1,050 5-PL 910 4-LG 800 3-ST 520 2-FS 190 1-HS	Long 750 Std 250 Fast 80	200	-30 to +350°C or -60 to +200°C	Fiber R25 Sleeve R10	NF-DH05
Diffus	330 6	Detecting part detail  Heat/freezing temperature resistant side side side side side side side side	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

- •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.

# **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



### 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 <250 to 350°C or below> fiber units (limited diffuse reflective type)

Clases aberiate detection   Support   Suppor	Туре		Features/dimensions (mm)  Sensing distance (mm)  Ambient		Bending radius	Model			
Part	1)	ipe		D3RF	D2RF	BRF			Model
Flat ON  332  3000  1000		300°C	Plat ON 7 20 2000  10.75 16.7 16.7 16.7 18.3 05 05 05 05 05 05 05 05 05 05 05 05 05	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 15 Std 0 to 10 Fast	6	or	R25	NF-DH06
Casing tube (SUSS04)   Silt mask   SUSS04    Silt mask   SUSS04    Silt mask   Susson	Limited diffuse reflective type	AFAAC .	33.2  3000  33.2  3000  According holes for 2-MG flash screes side side side side side side side s	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 20 Std 4 to 20 Fast	4 to 17	(Ordinary temperature side:	R25	NF-DH10
		250°C	Sit mask (SUS304)  Sit mask (SUS304)  Sit mask (SUS304)  Sit mask (SUS304)  Sit mask (SUS305)  Sit mask (SUS	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	6 to 38 Std 7 to 30 Fast	8 to 25	(Ordinary temperature side:	R25	NF-DH11

<sup>●</sup>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.



Specialized Photoelectric Sensors

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/quid leakage/
water detection



# 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	Ethogol lock diplocked white and	✓
Glycols	Ethanol, butyl alcohol, glycerol	✓
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)

т.		Frakusa (dimensione (		Sensing dis	stance (mm)		Ambient	Bending radius	Model
ıy	pe	Features/dimensions (mm)	D3	RF	D2RF	BRF	temperature	(mm)	Model
eam type	are	Side ON, Free cut  15 2000  4 7.5 +(5.8) 3 2-03.2  (1)  13 -(6) - Light axis 7 - Degree of protection on IP67 (excluding coaled surfaces that have been cut)	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
Through-beam	Square	Side ON, Fiber length: 5 m, Free cut  15 5000  4 7.5	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.



through-beam type
Correct use

### 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

# Chemical resistant fiber units (through-beam type)

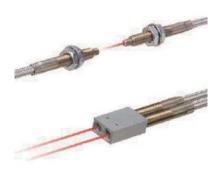
		F. A. W. A. L. L.	Sensing di	stance (mm)		Ambient	Bending radius	M
	ype	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
		Heat resistant, Free cut  2000 \$\frac{1}{2}\text{000}  \frac{1}{2}\text{000}   \frac{1}{2}\text{000}  \frac{1}\text{000}  \frac{1}{2}\text{000}  \frac{1}{2}\text{000} \	7-EL 4,000 2.800 6-UL 4,000 2.900 5-PL 4,000 1-HS 3,000	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  2000 ½00  1100 ½0  20  25  (lens outer diameter)  Degree of protection on IP67 (excluding coated surfaces that have been cut)	7-EL 4,000 6-UL 4,000 5-PL 4,000 1-HS 500	Long 2,200 Std 1,300 Fast 550	650	-40 to +105°C	R60	NF-TY01-3
Through-beam type	ø6	Side view, Free cut o5 fluoroplastic tube o1 x 1 o6 o2.2 Degree of protection on IP67 (excluding coated surfaces that have been cut)	7-EL 4,000 6-UL 3,500 5-PL 2,800 4-LG 2,000	Long 1,500 Std 800 Fast 400	500	-40 to +70°C	R60	NF-TY02
Throug		Side view, Free cut  3000 : ½00  100 : ½0  100	7-EL 4,000 6-UL 3,500 5-PL 3,000 4-LG 2,000	Long 1,500 Std 800 Fast 400	480	-40 to +70°C	Fiber R25 Tube R60	NF-TY02-TF3
		Elbow, Free cut  o5 (lens outer diameter)  35 max  (1.0)  20  (R7.5)  3000 *:000  (tube outer diameter)  Degree of protection on IP67 (excluding coated surfaces that have been 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	3,000 8td 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)

	<b>T</b>		Features/dimensions (mm)	Sensing	distance (mm)		Ambient	Bending radius	Model
	Туре		reatures/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Wodei
Diffuse tyne		ø6	Heat resistant, Free cut of fluoroplastic tube o2.2	7-EL 440 6-UL 280 5-PL 250 4-LG 225	Long 100 Std 70 Fast 50	45	-40 to +100°C	R60	NF-DY01 Only in industry

- ullet The sensing distances for the diffuse type fiber units are values on 500  $\times$  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.



# Can be used in vacuums and high temperatures up to 300°C

- Vacuum resistant through-beam types, diffuse types, and limited diffuse reflective types are available
- Long range lenses and side view lenses for through-beam types are also available

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

Three types of vacuum resistant detection methods are available including through-beam type, Diffuse type, and limited diffuse reflective type. Please select based on the mounting style and application. Also, vacuum resistant long range lenses and side view lenses for through-beam types are also available.

NF-TN01 (through-beam type)

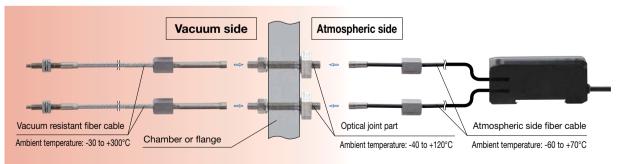
NF-DN01 (diffuse type)

NF-DN02 (limited diffuse reflective type)





# Product composition



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

iotro romootive

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

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

# Vacuum resistant fiber cable (through-beam type)

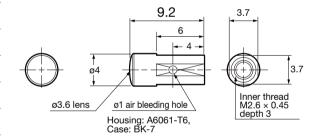
<b>T</b>	Footom (Aller on Aller on Alle	Sensing dis	tance (mm)		Ambient	Bending radius	Model
Туре	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
Through-beam type	Lens attachable, Free cut (atmospheric side) <a href="#"> <a< td=""><td>7-EL 790 6-UL 740 5-PL 640 4-LG 560 3-ST 360 2-FS 210 1-HS 70</td><td>Long 450 8td 280 Fast 130</td><td>150</td><td>-30 to +300°C</td><td>Vacuum side R18 Atmospheric side R25</td><td>NF-TN01 Standard item</td></a<></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a>	7-EL 790 6-UL 740 5-PL 640 4-LG 560 3-ST 360 2-FS 210 1-HS 70	Long 450 8td 280 Fast 130	150	-30 to +300°C	Vacuum side R18 Atmospheric side R25	NF-TN01 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.

# Lens for vacuum resistant fiber cable

Long range lens (for NF-TN01)

NF-TA06 (2 pieces)

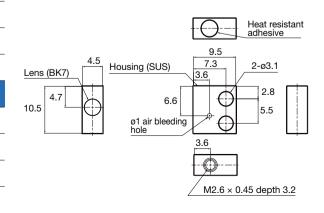


Sensing distance (mm)										
D3RF	D2RF	BRF								
7-EL 3,500 6-UL 3,200 5-PL 2,800 4-LG 2,500 3-ST 1,200 2-FS 950 1-HS 300	Long 3,500 Std 1,500 Fast 900	1,000								

Ambient temperature: -60 to +350°C

Side view lens (for NF-TN01)

NF-TA07 (2 pieces)



	Sensing distance (mm)											
D3RF	D2RF	BRF										
7-EL 3,500 6-UL 3,200 5-PL 2,800 4-LG 2,500 3-ST 2,300 2-FS 1,000 1-HS 350	Long 3,500 Std 1,700 Fast 700	1,000										

Ambient temperature: -30 to +300°C

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

through-beam type

Correct use

# Vacuum resistant fiber cable (diffuse type)

_		Sensing di	stance (mm)		Ambient	Bending radius	
Type	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
Diffuse type	Free cut (atmospheric side) <a href="#"> <a hre<="" td=""><td>7-EL 4-70 4-70 4-50 5-91 3-90 4-1-6 3-5T 220 2-FS 1-3-5 1-3-5 4-1</td><td>Long 5 to 250 Std 5 to 200 Fast 10 to 70</td><td>100</td><td>-30 to +300°C</td><td>Vacuum side R18 Atmospheric side R25</td><td>NF-DN01</td></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a></a>	7-EL 4-70 4-70 4-50 5-91 3-90 4-1-6 3-5T 220 2-FS 1-3-5 1-3-5 4-1	Long 5 to 250 Std 5 to 200 Fast 10 to 70	100	-30 to +300°C	Vacuum side R18 Atmospheric side R25	NF-DN01

- ●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.

# Vacuum resistant fiber cable (limited diffuse reflective type)

<b>T</b>	Fach was fellow and laws a	Sensing dis	stance (mm)		Ambient	Bending radius	Model
Type	Features/dimensions (mm)	D3RF	D2RF	BRF	temperature	(mm)	Model
Limited diffuse reflective type	Glass substrate detection, Free cut (atmospheric side)     3000  3000  3000  3000  4 (SUS)  4 (SUS)  10.75  64  604  603.6  Box nut for mounting width across flats 8 (SUS)  10.75  10	7-EL 0 to 22 6-UL 0 to 12 5-PL 0 to 11 4-LG 0 to 9 3-ST 0 to 7 2-FS 3 to 4 1-HS Unusable	Long 0 to 8 Std 2.5 to 5 Fast Unusable	3	-30 to +300°C	Vacuum side R18 Atmospheric side R25	NF-DN02

•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.

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/

Lens for through-beam type

Correct use

# 19

# Liquid level/liquid leakage/water detection



Fiber amplifier
D3RF
D3IF
O P.110





# Fiber units for detecting liquid

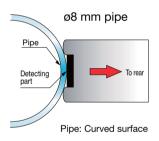
- Select based on applications for liquid level, liquid leakage, and water detection
- Array type NF-DF07 that can be mounted on ø8 to ø80 mm pipes
- A liquid accumulation prevention structure is used for all liquid level contact type models.

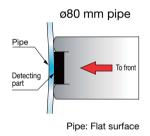
# Liquid level detection 1: Pipe-mounted type

# Array type mountable on ø8 to ø80 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  $18 \times 8.75$  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 Ø80 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.





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

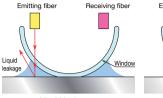
# Liquid leakage detection

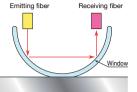
# Detects leakage (liquid leakage) to liquid leakage pan: NF-DW02



## 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.





Liquid leakage pan

Liquid leakage pan

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

Ту	/ре	Dimensions (unit: mm)	Details	Ambient temperature	Bending radius	Model
		For detecting upper limit level, Free cut  17  Mounting hole (for zip ties)  17  (9,4)  6.5 5,2 0,3  28.3  20.3 7.8  22.2  Detecting part detail  8.75  Detecting part lemitting/receiving alternating rows)	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
etection	ited	For detecting lower limit level, Free cut  20 2000  12 1000 12 1000 12 1000 12 1000 12 1000 12 1000 12 1000 12 1000 12 1000 12 1000	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
Liquid level detection	Pipe-mounted	For detecting upper limit level, Heat resistant, Free cut  20 20 2-03.2 mounting hole Housing (polyetherimide) 03 (PVC) 01 × 2  13 10 2  10 2000	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  20 2-03.2 mounting hole Housing (polyetherimide) 03 (PVC) 01 x 2 000 13 10 4 14 200 000 01 x 2	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.

OPTEX E e

through-beam type
Correct use

### 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

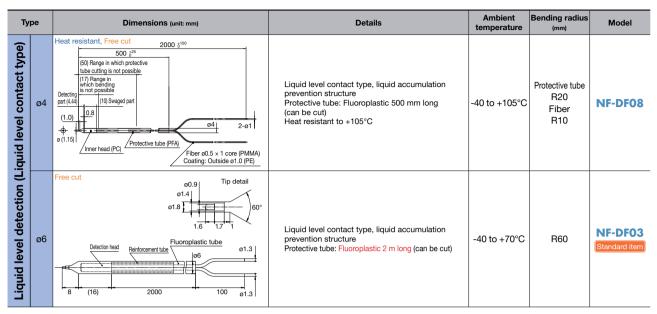
Vacuum resistant

# Liquid level/liquid leakage/

Lens for through-beam type

Correct use

# **Liquid level detection fiber**



●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

Ту	pe	Dimensions (unit: mm)	Details	Ambient temperature	Bending radius	Model
Liquid leakage detection	Square	Free cut  Emitting indicator Housing (fluororesin)  20  10  1	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

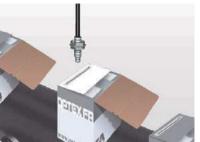
●Install with an ambient humidity between 35 and 85%. In the case of 85% RH, the ambient temperature should be between 0 and 40°C.

# 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.

# Detection of chemicals in transparent bottles Detection of adhesives





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

Т	ma	Dimensions (unit: mm)	Sensing dis	stance (mm)	Ambient	Bending radius	Model
ıy	pe	Difficultisions (unit: mm)	D3IF-TN	BIF	temperature	(mm)	Wiodei
Through-beam type	M4	Heat resistant  28 1000 1300 3 15 10 1000 1300 SUS303 M4 P=0.7 01.5 05 04 SUS303 M2.6 P=0.45 Plastic	7-EL 650 6-UL 350 5-PL 300 4-L6 250 3-ST 230 2-FS 150 1-HS 60	100	-40 to +200°C	R25	NF-TW01
Diffuse type	M6	Heat resistant    1000 *100   1000	7-EL 280 6-UL 125 5-PL 110 4-LG 100 3-ST 85 2-PS 45 1-HS 20	30	-40 to +200°C	R25	NF-DW01

- $\bullet$  Use D3IF-TN or BIF-WN/-CWN fiber amplifiers for water detection
- $\bullet$  The sensing distances for the diffuse type fiber units are values on 500  $\times$  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

resistant Vacuum

resistant Liquid level/liquid leakage

water detection

through-beam type

Correct use

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

# Lens for through-beam type



Lens for small object detection NF-DA O P.64







# Lenses 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)

_	Dimensions (mm)	Applicable D3RF sensing distance (mm)							Ambient		
Type		fiber units	7-EL	6-UL	5-PL	4-LG	3-ST	2-FS	1-HS	temperature	Model
	Standard	NF-TB01	4.000	4.000	4.000	4.000	4,000	2,500	800		
	ø4.4 ø5 (brass with nickel plating)	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	-40 to +100°C	NF-TAO
	Lens 2.5 7.5	NF-TR01	4,000	4,000	4,000	4,000	4,000	4,000	1,800	.0 10 1 100 0	(2 pieces
	/ diameter: 10	NF-TK77	4,000	4,000	4,000	4,000	4,000	4,000	2,000		
	Inner thread M2.6 × 0.45 depth 3	NF-TH01	4,000	4.000	3,200	2,700	2,500	1,400	500		
	Heat resistant	NF-TB01	4,000	4,000	4,000	4,000	4,000	2,000	360		
S	Knurling	NF-TB02	4,000	4,000	4,000	4,000	4,000	4,000	1,200		
ē	A6061-T6	NF-TB06	4.000	4.000	4.000	4.000	4.000	4.000	1,200		
<u>-</u>	Lens    ø4.3	NF-TJ01	2,000	2,000	2,000	2,000	2,000	2,000	600		
ŏ		NF-TR01	4,000	4,000	4,000	4,000	4,000	2,000	800		NF-TA0
ᆲ	ø4 <b>-</b>	NF-TK77	4,000	4,000	4,000	4,000	4,000	2,000	600	-40 to +350°C	(2 pieces
<u> </u>		NF-TH01	4.000	4.000	4.000	4,000	4,000	2,000	1,200		Low cost
g	9.2	NF-TH08	4,000	4,000	4,000	4,000	4,000	2,000	800		LOW COST
Long range lens		NF-TH10	2,000	2,000	2,000	2,000	2,000	2,000	750		
_	Inner thread M2.6 × 0.45 depth 3	NF-TH10	2,000	2,000	2,000	2,000	2,000	2,000	1.000		
	SUS housing	NF-TB01	4,000	4,000	4,000	4,000	4,000	2,500	800		
	inner thread M2.6 × 0.45 depth 3	NF-TB02	4,000	4,000	4,000	4,000	4,000	4,000	1,800		
	Lens diameter: ø3.5 ø4.4 ø5 (SUS)	NF-TB02	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	-40 to +100°C	NF-TAO
		NF-TR01	4,000	4,000	4,000	4,000	4,000	4,000	1,800	-40 to +100 C	(2 pieces
	2.5 7.5	NF-TK77	4,000	4,000	4,000	4,000	4,000	4,000	2.000		(
	10	NF-TK//	4,000	4,000	3,200	2,700	2,500	1,400	500		
			,	,							
ટ	Heat resistant	NF-TB01 NF-TB02	4,000	4,000	4,000	4,000	4,000	4,000	4,000		
<u> </u>	17	NF-TB02 NF-TB06	4,000 4,000								
æ	ø12 8		-								
Ĕ	9 - 6 -	NF-TJ01	2,000	2,000	2,000	2,000	2,000	2,000	2,000		NF-TA0
<u> </u>	010.2	NF-TR01	4,000	4,000	4,000	4,000	4,000	4,000	4,000	-60 to +350°C	
Ĕ,		NF-TK77	4,000	4,000	4,000	4,000	4,000	4,000	4,000		(2 pieces
우	' ' ' ' ' '	NF-TH01	4,000	4,000	4,000	4,000	4,000	4,000	4,000		
Ultra-long range lens	Housing: SUS303 Inner thread Lens: glass M4 x 0.7 depth 6	NF-TH08	4,000	4,000	4,000	4,000	4,000	4,000	4,000		
5	Lond . glass	NF-TH10	2,000	2,000	2,000	2,000	2,000	2,000	2,000		
		NF-TH11	2,000	2,000	2,000	2,000	2,000	2,000	2,000		
	Standard ø5 (brass with nickel plating)	NF-TB01	3,600	2,500	2,000	1,600	1,200	650	200		
		NF-TB02	4,000	3,500	3,000	2,400	1,800	1,000	300	40.1 7000	NF-TA0
	Inner thread	NF-TJ01	2,000	1,900	1,600	1,500	950	600	200	-40 to +70°C	(2 pieces
JS	2.75 M2.6 × 0.45 depth 3	NF-TR01	4,000	3,300	2,400	2,000	1,500	900	200		(E picces
<u>•</u>	9	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		
Side-view lens	Rod prism Brass with nickel	NF-TB02	4,000	2,400	2,300	2,000	1,200	800	250		
	Knurling plating	NF-TJ01	2,000	1,900	1,700	1,500	950	600	200		NIE TAG
		NF-TR01	4,000	1,700	1,600	1,300	850	550	160		NF-TA0
	04	NF-TK77	4,000	1,900	1,700	1,500	950	600	200	-60 to +300°C	(2 pieces
		NF-TH01	4,000	1,500	1,300	1,200	800	450	160		Low cost
	Inner thread M2.6 × 0.45 depth 3	NF-TH08	4,000	1,600	1,500	1,200	800	550	170		200 6031
	8 Nation 2040 deputs	NF-TH10	2,000	1,100	1,000	850	600	300	100		
		NF-TH11	4,000	1,400	1,200	1,100	700	400	150		

●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

resistant Vacuum

resistant

Liquid level/liquid leakage/ water detection

Lens for through-beam type

Correct use

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

				Sensing di	stance (mm)				
Type	Dimensions (mm)	Applicable fiber units		D2RF		BRF	Ambient temperature	Model	
		inder units	Long	Std	Fast	DKF	temperature		
	Standard ø4.4 ø5 (brass with nickel plating)	NF-TB01	3,500	3,500	1,500	3,000			
	54.4 55 (51.65 min.mon.s passing)	NF-TB02	3,500	3,500	1,500	3,500			
		NF-TB06	3,500	3,500	3,500	3,500	]	NF-TA01	
		NF-TJ01	1,500	1,500	1,500	1,500	-40 to +100°C		
	Lens 2.5 7.5	NF-TR01	3,500	3,500	3,000	3,000		(2 pieces)	
	diameter: 10   10	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			
S	Knurling	NF-TB02	3,500	3,500	3,000	3,500	]		
<u> </u>	Lens A6061-T6	NF-TB06	3,500	3,500	2,800	3,500			
O	\	NF-TJ01	1,500	1,500	1,500	1,500		NF-TA03	
و		NF-TR01	3,500	3,500	2,000	2,500	-40 to +350°C		
ā	04	NF-TK77	3,500	3,500	1,700	3,500	-40 10 +350 0	(2 pieces)	
Long range lens		NF-TH01	3,500	3,500	2,700	3,500	]	Low cost	
Ĕ	9.2	NF-TH08	3,500	3,500	1,900	2,100	]		
Ľ	Inner thread M2.6 × 0.45 depth 3	NF-TH10	1,500	1,500	1,500	1,500			
	miler thread M2.0 × 0.40 depth 0	NF-TH11	1,500	1,500	1,500	1,500			
	SUS housing Inner thread M2.6 × 0.45 depth 3	NF-TB01	3,500	3,500	1,500	3,000			
	Lens diameter: ø4.4 ø5 (SUS)	NF-TB02	3,500	3,500	1,500	3,500			
		NF-TB06	3,500	3,500	3,500	3,500		NF-TA01S	
	2.5	NF-TJ01	1,500	1,500	1,500	1,500	-40 to +100°C		
		NF-TR01	3,500	3,500	3,000	3,000		(2 pieces)	
		NF-TK77	3,500	3,500	3,000	3,500			
		NF-TH01	3,500	3,500	2,500	3,500			
G	Heat resistant	NF-TB01	3,500	3,500	3,500	3,500			
Ë	17	NF-TB02	3,500	3,500	3,500	3,500			
<u>-</u>	ø12 8	NF-TB06	3,500	3,500	3,500	3,500			
D G	→   ø9   ←           -   6   ←	NF-TJ01	1,500	1,500	1,500	1,500			
<u> </u>		NF-TR01	3,500	3,500	3,500	3,500	-60 to +350°C	NF-TA04	
ng	010.2	NF-TK77	3,500	3,500	3,500	3,500	00 10 1000 0	(2 pieces)	
후		NF-TH01	3,500	3,500	3,500	3,500			
Ultra-long range lens	Material: Housing: SUS303 Inner thread	NF-TH08	3,500	3,500	3,500	3,500	]		
≓	Lens : glass M4 × 0.7 depth 6/	NF-TH10	1,500	1,500	1,500	1,500			
		NF-TH11	1,500	1,500	1,500	1,500			
	Standard ø5 (brass with nickel plating)	NF-TB01	1,500	800	400	600	]		
		NF-TB02	1,500	1,000	450	600		NF-TA02	
	Inner thread	NF-TJ01	1,500	800	450	500	-40 to +70°C	(2 pieces)	
S	2.75 M2.6 × 0.45 depth 3	NF-TR01	1,000	700	450	500	_	(z pieces)	
Side-view lens	9	NF-TK77	1,500	800	450	600			
>	Heat resistant	NF-TB01	1,800	900	400	500			
ē	Rod prism	NF-TB02	1,800	900	400	500			
` <b>&gt;</b>	Knurling Brass with nickel plating	NF-TJ01	1,300	600	300	400		NIE TAGE	
<u>ė</u>		NF-TR01	1,100	600	250	350		NF-TA05	
)id	04	NF-TK77	1,300	600	300	400	-60 to +300°C	(2 pieces)	
(1)		NF-TH01	1,000	500	250	400		Low cost	
	2.5 Inner thread M2.6 × 0.45 depth 3	NF-TH08	1,100	600	250	350			
	8	NF-TH10	700	300	180	300	_		
		NF-TH11	900	500	250	350			

<sup>•</sup>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.

Specialized Photoelectric Sensors

Laser Displacement Sensors

## **Fiber Units**

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

Flexible R1/R2

Retro-reflective

detection

Screen/Array

Limited diffuse

Narrow view/ wafer mapping

Heat resistant

Chemical

Vacuum resistant

Liquid level/liquid leakage/ water detection

Lens for through-beam type

Correct use

# Notes for fiber sensor usage

# **Correct use**

# Do not use this product as a detection device for protecting the human body.

# **Mounting**

# ■ Mounting fibers with positioning bosses

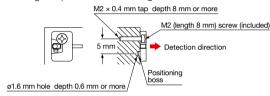
### <NF-DC08>

· Use an M2 countersunk screw (not included with this product). The positioning boss insertion holes on the bottom surface need to be ø1.7 mm and at least 0.8 mm deep.

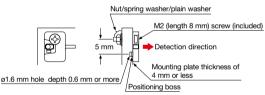


# <NF-TE01/NF-DE01 (Flat ON type)>

If cutting a tap into the mounting surface



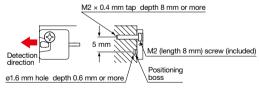
If using the included screw/nut



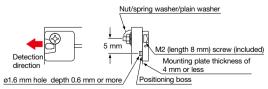
(Note 1): The above diagram shows NF-TE01. The same mounting method is used for NF-DE01. (Note 2): Through-beam type fibers have the same shape. When mounting, pay attention to the positions of the mounting screw hole and positioning boss hole

### <NF-TE02/NF-DE02 (Head ON type)>

If cutting a tap into the mounting surface

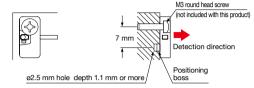


If using the included screw/nut



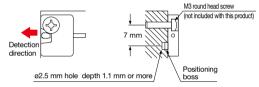
(Note 1): The above diagram shows NF-TE02. The same mounting method is used for NF-DE02. (Note 2): Through-beam type fibers have the same shape. When mounting, pay attention to the positions of the mounting screw hole and positioning boss hole

### <NF-TE03/NF-DE03 (Flat ON type)>



(Note 1): The above diagram shows NF-TE03. The same mounting method is used for NF-DE03. (Note 2): Through-beam type fibers have the same shape. When mounting, pay attention to the positions of the mounting screw hole and positioning boss hole

### <NF-TE04/NF-DE04 (Head ON type)>

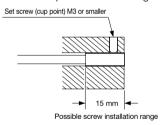


(Note 1): The above diagram shows NF-TE04. The same mounting method is used for NF-DE04. (Note 2): Through-beam type fibers have the same shape. When mounting, pay attention to the positions of the mounting screw hole and positioning boss hole

### Mounting NF-DR09/-RR01

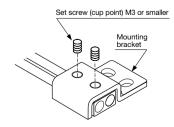
### <If not using the included mounting bracket>

· Using a set screw (cup point of M3 or smaller), mount within 15 mm of head portion bracket edge.



### <If using the included mounting bracket>

- · The head portion can be secured even without use of a set screw.
- · If using a set screw, secure using a set screw with an M3 cup point.





# Photoelectric Series

### Photoelectric Sensors

Specialized Photoelectric Sensors

Laser Displacement Sensors

# Fiber Units

Easy mounting

Thread type

Cylindrical type

Sleeve type

Flexible R4/R2

1 10/11010 11 1/112

Flexible R1/R2

Retro-reflective

Small object detection

Screen/Array

Limited diffuse

Narrow view/ wafer mapping

Heat resistant

Chemical resistant

Vacuum resistant

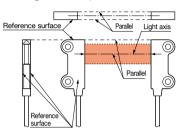
Liquid level/liquid leakage/ water detection

Lens for through-beam type

Correct use

# Mounting through-beam type screen fibers (NF-TZ07/-TZ08/-TZ09/-TZ10)

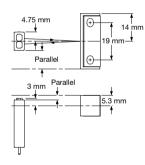
- Please be aware that because the aperture angle of this product is extremely narrow, light may not be taken in depending on installation conditions.
- When installing, determine a reference surface as shown in the diagram below while paying sufficient attention in regards to light axis shifting and slanting. Install so that emitting/receiving fibers are parallel.



# **■ Mounting NF-RB02**

- Because the aperture angle of this product is extremely narrow, light may not be taken in depending on installation conditions.
- · As shown in the diagram below, install so that the centers of the fiber head and reflector are aligned. Pay attention for light axis shifting and slanting.

# <Side ON type/NF-RB02>



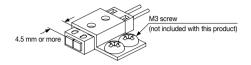
## <Notes regarding NF-RB02>

 If detecting items such as transparent objects, detection may be unstable if the objects are within range of 0 to 20 mm from the window.

If mounting using the included fiber mounting bracket

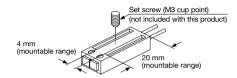
 If using the fiber mounting bracket to mount a Side ON type fiber, mount so that there is no interference with the detecting part. If mounting using the included fiber mounting bracket

 The fiber mounting bracket can be used to secure the fiber without use of an M3 set screw.



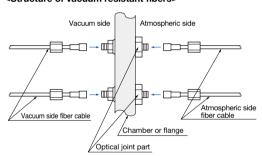
If mounting using an M3 set screw (cup point)

· Secure with an M3 set screw within the mounting range shown in the diagram below.



# ■ Mounting vacuum resistant fibers (NF-TN01/-DN01)

## <Structure of vacuum resistant fibers>

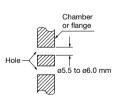


Leakage amount: 1.33 × 10<sup>-10</sup> Pa·m³/s [He] or less

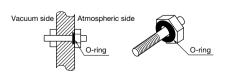
### <Mounting>

1. Drill two holes into the vacuum chamber wall (chamber or flange).





Mount the optical joint part to the vacuum chamber wall. When mounting to the vacuum chamber wall, the O-ring included with this product must be attached and the side to which it is attached must be the atmospheric side.



### 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

detection

Screen/Array

Limited diffuse

Narrow view/ wafer mapping

Heat resistant

Chemical

Vacuum resistant

Liquid level/liquid leakage/ water detection

Lens for through-beam type

Correct use

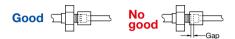
Notes for fiber sensor usage

# Correct use

Mount the atmospheric side fiber cable bracket to the atmospheric side of the optical joint part.

(Note 1): Tighten the nut securely.

If the nut is loose, there may be a gap, causing the sensing distance to drop.



4. Mount the vacuum side fiber nut to the vacuum side of the optical joint part.

(Note 1): Tighten the nut securely.

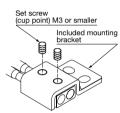
If the nut is loose, there may be a gap, causing the sensing distance to drop.

5. Secure the tip of the vacuum side fiber.

### <For NF-DN01>

If using a mounting bracket

- Tighten using a set screw (cup point of M3 or smaller).
- By mounting the mounting bracket to the housing, it is possible to automatically secure the head without using a set screw.



If not using a mounting bracket

 As shown in the diagram to the right, using a set screw (cup point of M3 or smaller), secure within 15 mm of head portion edge.



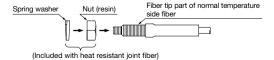
# Mounting heat resistant joint fibers (NF-TH12/-TH13/-TH14/-TH15/-TH16)

## <Connecting heat resistant joint fibers to Ordinary temperature side fibers>

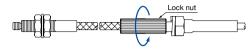
· Use the following procedure to connect normal temperature side fibers.

## Procedure

 Attach the plastic nut included with the heat resistant joint fiber and spring washer as far as possible on the fiber tip of the normal temperature side fiber.

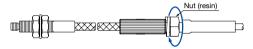


2. Mount the heat resistant joint fiber and normal temperature side fiber using a lock nut.



(Note 1): Do not secure the lock nut using the plastic nut and spring washer from Procedure 1.

3. To prevent the lock nut from becoming loose, secure using the plastic nut used for mounting in Procedure 1.

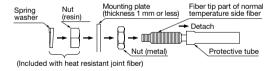


### <If mounting connecting parts to the mounting plate>

- If securing parts that connect the heat resistant joint fiber and normal temperature side fiber to the mounting plate using the included metal nuts, use the procedure below.
- · The mounting plate thickness needs to be 1 mm or thinner.

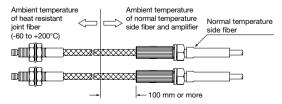
### Procedure

- Remove the protective tube from the normal temperature side fiber, attach the included metal nut from the tip of the fiber and move it to the fiber part.
- 2. Insert the tip of the fiber into the mounting plate.
- Connect the heat resistant joint fiber to the normal temperature side fiber using the same procedure from Connecting heat resistant joint fibers to normal temperature side fibers>
- Tighten the metal nut mounted in Procedure 1 to the mounting plate.



### <Operating Temperature>

 In order to protect normal temperature side fibers and amplifiers, keep the heat resistant joint fiber at least 100 mm from the boundary of the normal temperature side as shown in the diagram below.





# **Photoelectric**

### 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

Vacuum resistant

Liquid level/liquid leakage/ water detection

Lens for through-beam type

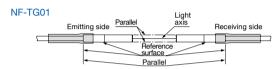
Correct use

# Mounting narrow view/wafer mapping fibers (NF-TG01/-TG02/-TG03/-TG04)

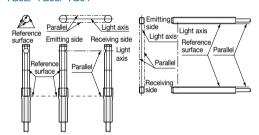
· Please be aware that because the aperture angle of this product is extremely narrow, light may not be taken in depending on installation conditions.

### <Through-beam type>

· When installing, determine a reference surface as shown in the diagram below while paying sufficient attention in regards to light axis shifting and slanting. Install so that emitting/receiving fibers are parallel.

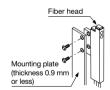


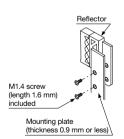
## NF-TG02/-TG03/-TG04



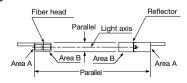
# <Reflective type>

- · Use the included 1.6 mm M1.4 screws to mount the fiber head and reflector to the mounting plate as shown in the diagram to the right. The mounting plate needs to have a thickness of 0.9 mm or thinner.
- · Use a thread lock compound to tighten screws when mounting them in places with vibrations or shocks.
- · Install the parts so that the mounting holes for the fiber head and reflector are parallel to one another and so that parts A, B and C are each parallel as shown in the diagrams below. Pay sufficient attention for light axis shifting and slanting.





## <Overhead view>



# on the fiber until a "click" is heard.

detection fibers (NF-TF01)

Mounting pipe-mounted liquid level

Area C

Mounting

Fiber head

· If using an SUS mounting bracket,

through the mounting hole on the mounting bracket and attach an M4

nut (not included with this product).

· If using a PVC mounting bracket,

glue it to the mounting surface so

that the side with "TOP" is facing up.

Also, weld it within the welding area

as shown in the diagram to the right.

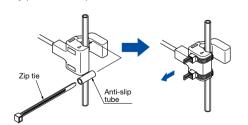
Slide the convex portion of the

mounting bracket attached to the steel case into the concave portion

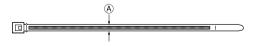
thread a welded M4 stud bolt

<Side view>

· Use the included zip ties and anti-slip tubes for mounting as shown in the diagram below. Also, use two zip ties on the upper and lower part to attach it securely, and cut off the any part of the zip ties that stick out.



· When additional zip ties are necessary, please use zip ties with a thickness 2.5 mm or smaller as shown by A in the diagram below.



■ Mounting liquid leakage detection fibers (NF-DW02) M4 nut M4 stud bolt

(straight type)

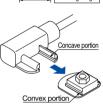
Area C

Mounting hol

Parallel

Reflector





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# 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 resistant

Liquid level/liquid leakage/ water detection

Lens for through-beam type

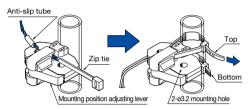
Correct use

# Notes for fiber sensor usage

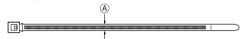
# Correct use

# Mounting pipe-mounted liquid level detection fibers (NF-DF04/-DF05)

 Use the included zip ties and anti-slip tubes for mounting as shown in the diagram below. When mounting the fiber, make sure that the mounting position adjusting lever is in the closed position as shown in the diagram below. Also, use two zip ties on the upper and lower part to attach it securely, and cut off the any part of the zip ties that stick out.



 When additional zip ties are necessary, please use zip ties with a thickness 2.5 mm or smaller as shown by (A) in the diagram below.



 $\cdot$  M3 screws, plain washers and spring washers must be used when using the mounting holes.

(M3 screws, plain washers and spring washers are not included with this product.)

- <Adjusting the positions of pipe-mounted liquid level detection fibers>
- · The attachment position can be easily readjusted when using zip ties to mount this product.

### Adjustment method

 Pull the mounting position adjusting lever open in the direction of the arrow.



Mounting position adjusting lever

Push the moveable part in the direction of the arrow to loosen the zip tie, and readjust the mounting position.



Close the mounting position adjusting lever in the direction of the arrow to return it to its original position.

(Note 1): Sensitivity settings must be reconfigured after readjusting the mounting position.

(Note 2): The positioning lever is for readjusting the mounting position on this device, not for tightening the zip ties. Tightening the zip ties while the mounting position adjusting lever is open and then closing the mounting position adjusting lever will damage the fibers.

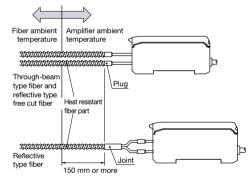
# Mounting chemical resistant angled-head fibers (NF-TY05)

 Use M3 screws and tighten them to a torques of 0.3 N·m or less.



# Notes regarding usage of heat resistant fibers

 In order to protect amplifiers, keep the heat resistant fiber part at least 150 mm from the boundary of the normal temperature side as shown in the diagram below.



- · Do not directly expose amplifiers to radiation heat or hot air.
- The tip bracket of the heat resistant fiber (up to 350°C) and stainless steel sheath may change color when used at high temperatures, but this does not affect their detection capability.

# Notes about slit masks included with NF-TZ07/-TZ08/-TZ09/-TZ10

 There are two types of slit masks included with these products (one type for NF-TZ07/-TZ08).

These slit masks can be used when detecting small objects or for preventing light saturation when using the fibers at close range. However, applying slit masks shortens the sensing distance.

Because the slit masks are of an adhesive type, when applying them to the fibers, align the slit projection with the top of the fiber as shown in the diagram on the upper right.



# notoelectric

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# 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

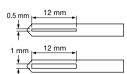
Liquid level/liquid leakage/ water detection

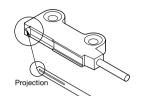
Lens for through-beam type

Correct use

## ■ Included slit masks

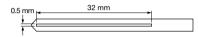






How to apply

<NF-TZ07/-TZ08>

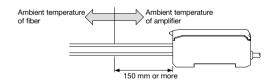


# For NF-TY01(-\( )/-TY02(-\( )/-TY03-TF3/\) -TY04/-TY05(-\( )/-DY01\)

Avoid use with the chemicals listed below.
 Chemicals that may erode PFA including fused alkali metals (sodium, potassium, lithium, etc.), fluorine gas (F2), CIF3, OF2 (including gaseous form), etc. Also, chemicals with high permeability including high temperature hydrofluoric acid, nitric acid, chlorine, etc.

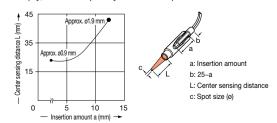
# ■ Notes regarding usage of NF-TY04/-DY01 (heat resistant type)

- In order to protect amplifiers, keep the heat resistant fiber part at least 150 mm from the boundary of the normal temperature side as shown in the diagram on the right.
- · Do not directly expose amplifiers to radiation heat or hot air.

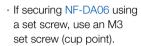


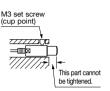
# Notes regarding usage of NF-DA06

· Spot size and sensing distance can be adjusted depending on the fiber insertion amount. Be aware that if inserted too deeply, the fiber tip may become separated from the lens.



 After setting the fiber and NF-DA06, secure using the nut included with the fiber to prevent moving caused by vibrations, etc.





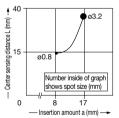
# Notes regarding usage of NF-DA01/ -DA02/-DA03/-DA04/-DA05

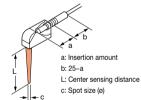
 If inserting fibers into NF-DA01/-DA02/-DA03/ -DA04/-DA05, inserting until the fiber comes to a stop.



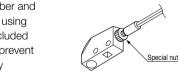
# Notes regarding usage of NF-DA07

· Spot size and sensing distance can be adjusted depending on the fiber insertion amount.





 After setting the fiber and NF-DA07, secure using the special nut included with NF-DA07 to prevent moving caused by vibrations, etc.



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otoelectric Sensors

### Photoelectric Sensors

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### 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

Correctues

# Correct use

Notes for fiber sensor usage

# **Correct use**

# Notes regarding liquid leakage/liquid level detection/chemical resistant fibers

- Clean NF-DW02 by wiping away all liquids that have adhered to the head and mounting bracket using a soft cloth. Also pay sufficient attention to any condensation that has formed on the detecting part.
- If the tips of the NF-DW02/-TF01 fibers are too short, be aware that the correct amounts of light may not be taken in, resulting in unstable detection.
- When installing NF-DW02, be sure to use the special mounting bracket as a countermeasure to human error (improper installation, etc.) Failure to use the special bracket may result in unstable detection.
   However, if using a PVC mounting bracket on the black matte part of the housing, sensing of human error (improper installation) may not be possible. Please confirm before using.
- · When cutting the protective tubes, take care not to damage the fiber sheath.
- Perform sensitivity settings for the NF-DW02 only after any liquids have been removed, the head has been mounted to the special mounting bracket, and the fiber has been attached to the amplifier. After performing the sensitivity adjustment, changing the fiber connection or installation will result in changes in the light detection volume, causing unstable detection. Changing fiber connections or installation during cleaning, etc., will have the same results. In such cases, perform amplifier sensitivity adjustments again.
- Amounts of light may decrease during extended periods of usage under conditions with high heat or humidity.
- Be aware that instability may occur in which a long period is necessary before detection stability can be regained if liquids incompatible with the materials of which the NF-DW02 head part is made (PFA) cause air bubbles to flood the detecting part. Always confirm the liquid to be detected before use.
- When cleaning the NF-DW02 confirm that the mounting bracket shows no scratching, contamination, or deformities.
- Water droplets adhered to the window will influence detection performance. Avoid use in areas where direct contact with water could be made.

Also pay sufficient attention to any condensation that has formed on the pipe exterior.

- Be aware that the NF-TF01/-DF04/-DF05 may not be able detect some low-transparency liquids and highlyviscous liquids with stability.
- Incomplete pipe mounting of NF-TF01/-DF04/-DF05 may have a severe influenced on detection performance. Use the included anti-slip tubes and install the detecting part to the pipe so it does not move.
- For the NF-TF01 to detect in a stable manner, amplifier sensitivity adjustments must be performed when there is no liquid in the pipe and after the fiber has been installed.
   Also, sensitivity must be reconfigured if the fiber installation condition on the pipe is altered, or if its routing is changed.
- The NF-DF04/-DF05 cannot properly detect through opaque pipes.
- Attach the detecting part of the NF-DF04/-DF05 so it is secured to the pipe. Failure to do so will result in malfunction.
- Because the NF-DF04/-DF05 does not have a water resistant or chemical resistant structure, avoid areas where water or chemicals could come in contact.
- Because adherence of water droplets on the window of the NF-DF04/-DF05 will affect detection, pay sufficient attention to any condensation that has formed on the pipe exterior. Also be aware that water droplets formed on the inside of pipes, as well as air bubbles adhered on the inside will affect detection.

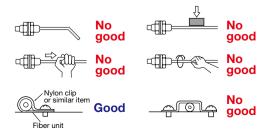
# **General notes**

# ■ Regarding fiber units

 Do not hit or damage the detection head surface.



2. Do not bend or apply excessive force to the fiber.





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

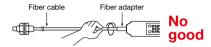
Lens for through-beam type

Correct use

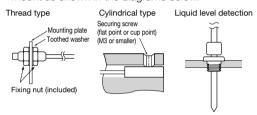
3. Do not apply excessive torque to the sensor head or use tools that do not match the nuts.



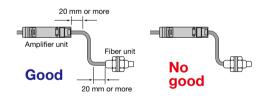
4. Do not twist in the gaps between the fiber cable and fiber adapter.



5. Depending on the bore shape of the sensor head, mount as shown in the diagrams below.

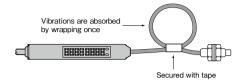


- 6. In the case of fibers that can be free cut, cut the tip with special fiber cutters before mounting to the fiber amplifier.
- 7. The fiber unit bending radius should be greater than the allowable bending radius. Excessive bending will shorted the sensing distance.
- 8. Allow for some wire to remain straight near the insertion and tip parts of the fiber unit.

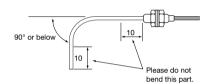


- 9. Because sensing distance may decrease by as much as 20% depending on the conditions of cut surface of the fiber or connection conditions with the amplifier, we recommend using with sensing distance set at 80% or below.
- 10. In areas subject to frequent vibration, secure so that the fiber unit itself will not vibrate. Especially work to limit vibrations from reaching connection points between the fiber and amplifier.

11. Use the method shown below to soften fiber head vibrations.



- 12. Do not use fiber units not protected with fluoroplastic in environments where organic solvents are used.
- 13. Do not bend the sleeve tip or base.



# Regarding fiber cutters

Cutting procedure

1. Adjust the length in the direction of the arrow, turn the stopper and lock the fiber in place.



2. Insert the fiber into the fiber cutter and cut it.



3. The procedure is complete. (Correctly cut fiber)

