Fiber sensor
NF Series

Amplifer for Fiber sensor
Amplifiers

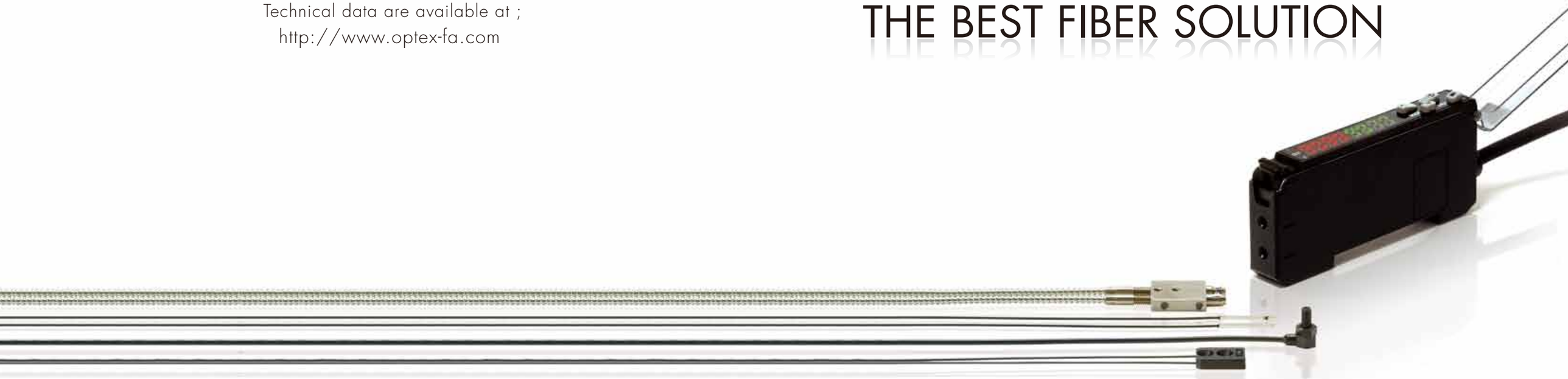
Digital high speed fiber Sensor
D3RF series

Digital fiber Sensor
D2RF series

Fiber Sensor
BRF series

Technical data are available at ;
http://www.optex-fa.com

THE BEST FIBER SOLUTION



- **Specifications are subject to change without prior notice.**
- **Specifications and technical information not mentioned here are written in Operation Manual. Or visit our website for details.**
- **All the warnings and cautions to know prior to use are given in Operation Manual.**

Fiber optic cables for the most demanding applications.
Special requests for custom made fiber cables are welcome.

CE

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AMPLIFIERS and FIBER SENSORS

Amplifiers

Fiber units

Notes

Introduction

Fiber unit NF series

A complete fiber optic sensor consists of the amplifier and a fiber optic cable.
The fiber optic cable is chosen based upon the specific application.
Optex-FA offers more than 80 different cables in both Thru-beam and Diffuse sensing modes.

Various Shape for mounting

Flexible

Various Detecting Scheme

Environment-resistant

Liquid

Extension lens

AMPLIFIERS for NF series

All amplifiers are available in Cabled or M8 QD versions and are offered with a choice of NPN or PNP outputs.

High speed digital fiber sensor

D3RF series 09

Digital fiber sensor

D2RF series 13

Fiber sensor with trimmer

BRF series 20

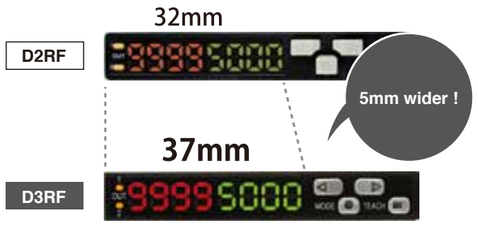
High speed digital fiber sensor

D3RF series

16μsec response, long sensing distance, finest in digital-class amplifiers.

Widest display in the class

5mm wider display than conventional D2RF.
7 segment with high brightness LED for better visibility.

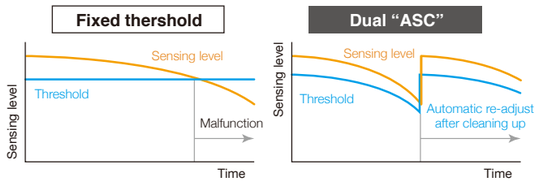


Easier operation

More than 2 sec. pressing the button for teaching. Higher functionality is in deeper setup layer. These prevent miss-operations.

Dual "ASC" for easy maintenance

Detects light degradation made by some dust and adjusts the brightness. It re-adjusts threshold automatically after cleaning up so no need re-teaching.

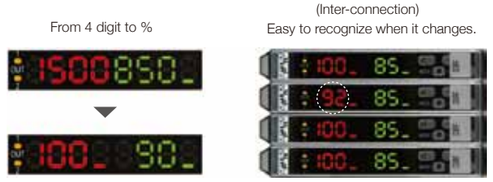


Sensing level changes when light path got some contamination and then it works wrongly . It needs re-teaching.

Threshold level is adjusted optimized level automatically according to sensing level continuously.

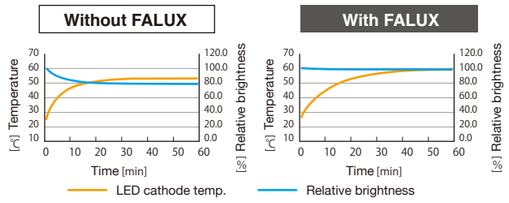
100% display for better recognition of change

Display can be changed to percentage (0~100) by simple single action with buttons. Easy to recognize when the level changes.



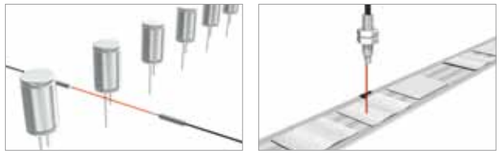
Brightness stabilizing function "FALUX"

Our original technology "FALUX" stabilizes LED brightness by adjusting LED current even under fluctuation of LED temperature after power up.



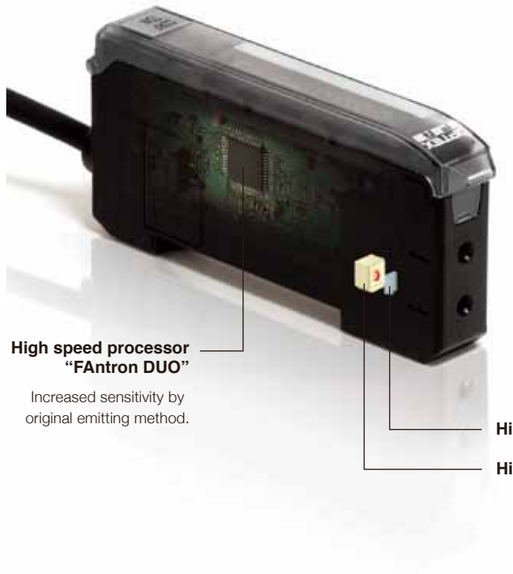
Adjustable hysteresis

Hysteresis can be adjusted from 1% to 40% as you like. This enables flexible setup of sensitivity according to various object condition.



Detecting parts leads

Detecting sheet objects



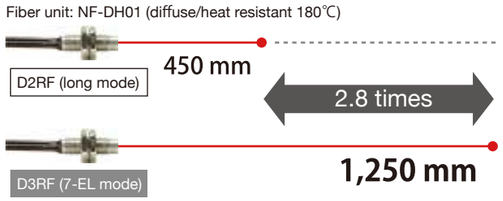
Fastest in the class
16μs(1-HS mode)
22μs(inter-connection type)

Digital fiber sensor **No.1**

Originally developed super high speed processor "FAntron DUO" enables fastest speed in the class 16 μs (1-HS mode). It can detect over 30,000 pieces per second. Maximum speed of inter-connection type is 22us. It can prevent cross talk up to 2 units.

Super sensing distance

Utilizing our original pulse emitting method, High power LED and efficient collective lens, it can receive enough light to realize around 3 times longer sensing distance for diffuse and 5 times longer sensing distance for thru-beam sensing.



Sensing distance comparison

	Fiber unit	D2RF (mm)	D3RF (mm)	ratio (times)
Diffuse	NF-DB01(M6 coaxial)	450	**1200**	2.7
	NF-DR01 (M6 R2mm)	350	**1100**	3.1
	NF-DH01 (180°C)	450	**1250**	2.8
Thru-beam	NF-TB01 (M4 coaxial)	1800	**4000**	2.2
	NF-TR01 (M4 R2mm)	800	**4000**	5
	NF-TH02 (180°C)	1000	**4000**	4

ECO mode

It has ECO mode that enable power saving by making sub-display (green) OFF and darken main-display (red).

ex.) D3RF-TDN (single, 2 output)

Standard mode : 39mA max. → -30% → **ECO mode : 28mA max.**

Easy installation

You can connect up to 16 units without any wiring.

Maximum inter-connect units

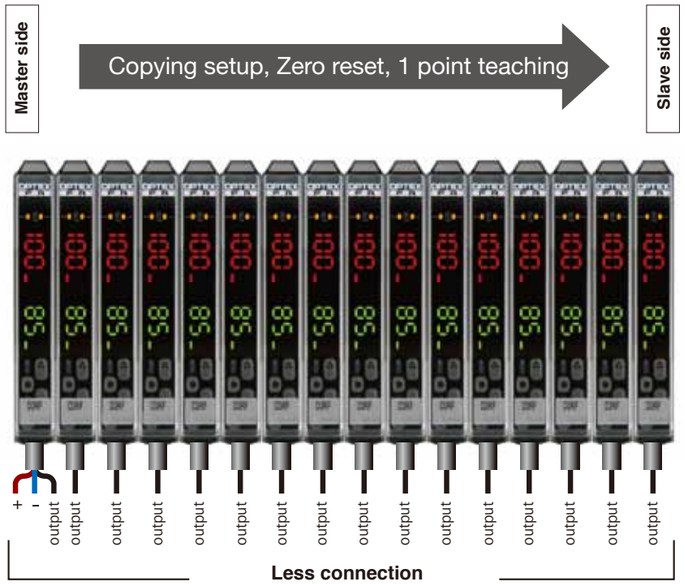
D2RF	D3RF
8 units	16 units (cross talk prevention: OFF or ECO mode)

Cross talk prevention

It can prevent cross talk by shifting emitting timing. You can connect up to 12 units when the setup is standard mode. You can connect up to 16 units when the setup is ECO mode.

Easy setup

You can copy setup from master side to slave side. Zero reset and 1 point teaching is available all together.

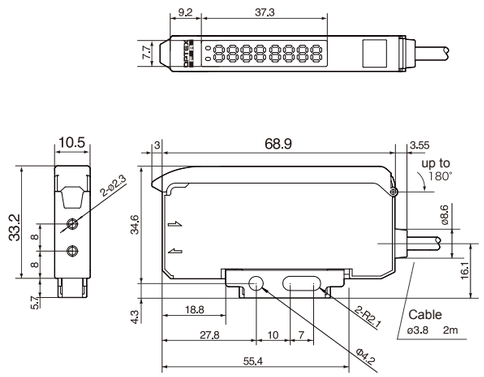


ex.) 18 wires for 16 units inter-connection (1ch output)

Dimensions

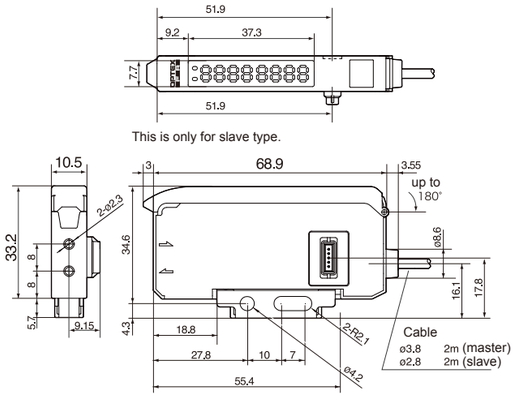
Single type

D3RF-TN/TDN
D3IF-TN



Interconnection type

D3RF-TMN/TDMN (master)
D3RF-TSN/TDSN (slave)



Specifications

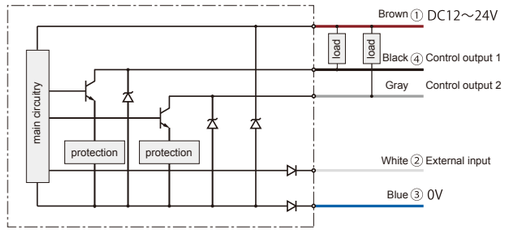
Model		Single type	Inter-connection type - master	Inter-connection type - slave	IR type
Cable type	1 output type (NPN/PNP)	D3RF-TN / TP	D3RF-TMN / TMP	D3RF-TSN / TSP	D3IF-TN / TP
	2 output type (NPN/PNP)	D3RF-TDN / TDP	D3RF-TDMN / TDMP	D3RF-TDSN / TDSP	-
M8 QD type	1 output type (NPN/PNP)	D3RF-TCN / TCP	D3RF-TCMN / TCMP	D3RF-TCSN / TCSP	D3IF-TCN / TCP
	2 output type (NPN/PNP)	D3RF-TCDN / TCDP	D3RF-TCDMN / TCDMP	D3RF-TCDSN / TCDSP	-
Light source		Red LED			IR LED (1,450nm)
Response type (mode)		16μs/22μs*1 (1-HS), 70μs (2-FS), 250μs (3-ST), 500μs (4-LG), 1ms (5-PL), 2ms (6-UL), 8ms (7-EL)			
Sensitivity adjust		Teaching, Manually adjusting			
Indicator	1 output type	1 Output indicator (Orange)			
	2 output type	2 Output indicator (Orange)			
Digital display		7 segment 8 digit display (red: 4 digit, green: 4 digit)			
Control output *2		NPN or PNP open collector 100mA/DC30V max. Load: 100mA max. Residual voltage: 1.8V max.			
Input		Teach-in *3, Emitter stop input, Synchronous input, Counter reset input (only for 2 output type)			
Timer		ON delay, OFF delay, One shot, ON+OFF delay, ON delay + One shot 0.1～9.999ms			
Output mode		Light ON / Dark ON switching is available in setup			
Cable / Connector		2m (single type and interconnection master type : ø3.8mm , slave type : ø2.8mm), or M8 connector			
Insulation impedance		20MΩmax. (DC500V)			
Ratings	Power supply	DC12～24V±10%including ripple			
	Power consumption (normal mode)	36mA max. (1 output type), 39mA max. (2 output type) / DC24V			
	Power consumption (saving mode)	25mA max. (1 output type), 28mA max. (2 output type) / DC24V (Eco All mode) *4			
Conformity		CE, IEC			
Operating temp./humid.		-25～+55℃ / 35～85%RH without condensation			
Environmental illuminance		Sunlight: 10000 lux max., Incandescent lamp: 3,000 lux max			
Vibration resistance		10~55Hz 1.5mm swing X,Y,Z 2hours			
Shock resistance		50G (500m/s²) X,Y,Z 3times			
Protection category / Material		IP50 / Case: PPE, Cover: PC			
Weight		Approx. 71g including cable			
Bracket		BEF-WLL170			

*1 Single type: 16us. When cross talk prevention mode is activated on interconnection type, it's 22us.
*2 Threshold, Timer and Light ON/Dark ON of control output for 2 output type can be setup individually.
*3 External teaching mode is done based on the mode that is set on sensor (default is 1 point teach).
*4 When you use 1~3 pieces interconnected including master.
Please use output less than 50mA each and in -25~+50°c when you use 4~8 pieces interconnected including maste

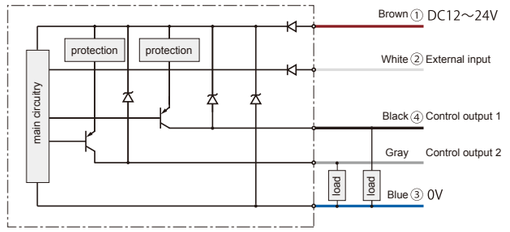
Interconnection type

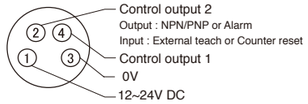
Circuit diagram

NPN output



PNP output

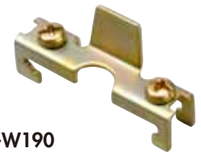




Options

End plate

BEF-EB01-W190



JCN-S : 2 meter
JCN-5S : 5 meter
JCN-10S : 10 meter

JCN-S : M8 Straight type

JCN-L : 2 meter
JCN-5L : 5 meter
JCN-10L : 10 meter

JCN-L : M8 L-shape type

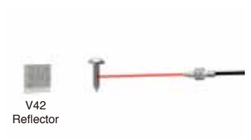
Digital Fiber Sensor

D2RF series

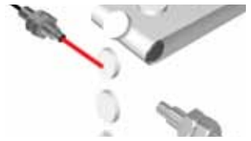
Digital Fiber Amplifier with Two Independent Outputs. High speed 60 micro second response.

6 teach method for individual applications.

Full Power Teaching
Standard detection mode for Thru-beam type sensing but applicable for retro-reflective sensing also.



Full automatic Teaching
Set while the equipment is operating.

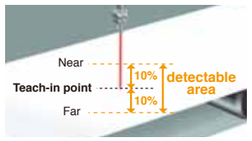


Single point Teaching
Set without a target present.

Transparent / Glass Teaching
Ideal for the detection of glass, film, plastic or any transparent material.

Two points Teaching
Standard detection mode for Diffuse type sensing.
It is possible to make fine adjustments.

Zone Teaching
Similar to Area Teach Mode.
This is useful if the conveyor moves closer to and farther from the sensor. An area +/- 10% of the teach point can be detected.



SAM Circuit - The ASC function (Auto Sensitivity Control)

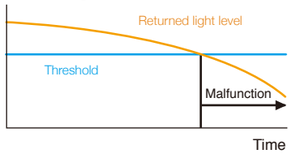
Our engineer "SAM" designed this function. The lens and/or reflector may be contaminated over time. The D2RF amplifier monitors the change in light level and automatically resets the threshold value.

After cleaning off the lens / reflector it used to be necessary to reset the threshold setting. The D2RF does not require this step. Simply clean off the lens and wait three seconds without a target present. The sensor will automatically reset the threshold level for the change. This is how the SAM circuit works.

After cleaning the incoming light level will increase suddenly. The SAM circuit computes the preset threshold based on the increase in light intensity.
This function is available only in Transparent Detection Mode.

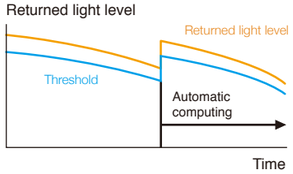
Conventional Sensor
Contamination on the lens will eventually cause the sensor to malfunction.

Returned light level



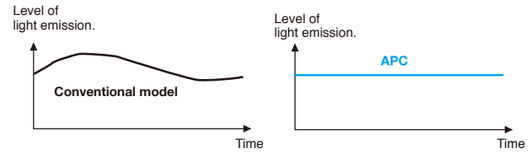
D2RF series
SAM Circuit
The threshold will auto-matically return to the preset level after the lens is cleaned off.

Returned light level



APC Function (Auto Power Control)

The APC function ensures precise sensing even when there are changes in the temperature or environmental conditions.
APC maintains a constant power level of light emission by regulating the current flow into the light emission element. The APC function can be turned On and Off.



Two four digit display's.

Received Light Level and Threshold Setting

IP66 and IP50, two types.

If your application is around water or high humidity.
There is a model of the D2RF-T series with an IP66 rating.

Long Term Stable Detection.

A conventional 3 element LED will lose brightness over time. This results in a decrease in sensitivity in the sensor. Optex FA's new D2RF uses a 4 element LED to provide long service life. The Green LED type D2GF uses a "Glan N2" LED, which offers the best performance for Mark Detection with a Green LED light source.

60 micro second high speed response.

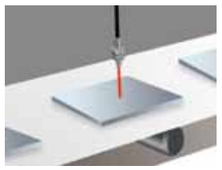
Both outputs can be set to operate at this speed.
This response time is available in 5 of the teach modes.

LED Power adjustment - 3 step adjustment of LED emitting power.

A highly reflective target will cause the amplifier to saturate making adjustment difficult. This can also happen if the fiber cable is mounted too close to the target.
In situations where the amplifier is saturated due to excessive reflected light, the power level of the emitting LED can be decreased to 50 or 25 percent.

Power setting

100%
50%
25%



Cross Talk Prevention

The amplifier frequencies are automatically set between the Master and Slave units. Cross talk prevention is possible for up to 4 amplifiers.

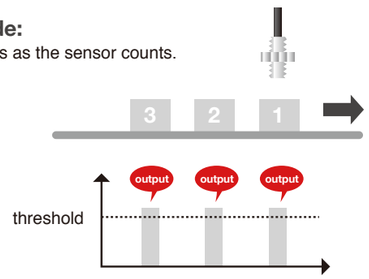
Automatic Tuning

This provides a way to boost or dampen the excess gain level of the amplifier in poor sensing conditions (low light level, low sensitivity or saturating condition). Automatic Tuning is ideal when you need a little bit better excess gain level, or when detecting a dark object with diffuse reflective fiber cables.

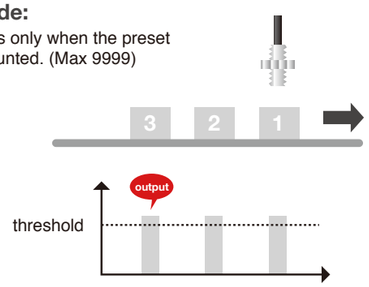
Counter Mode

The D2RF amplifier features a built-in counter. This makes it convenient to count parts, for example 10 pcs. in a bag. The output turns on once the sensor has counted the desired quantity. Simply program in the number of parts to count.

Normal Mode:
An output comes as the sensor counts.



Counter Mode:
An output comes only when the preset numbers are counted. (Max 9999)



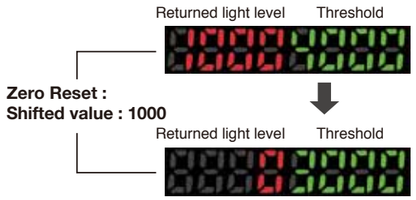
Edge Sensing

The sensor output triggers when there is a sudden increase or decrease in the light level. This is ideal for sensing objects without being influenced by a dusty environment.

Rising Edge Sensing Mode **Falling Edge Sensing Mode**

Zero Reset

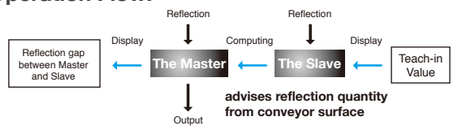
The sensor display can be reset to zero. This is useful for adjusting the display's of the Master and Slave units to read the same. It is also good to set the value to zero when the light is interrupted.



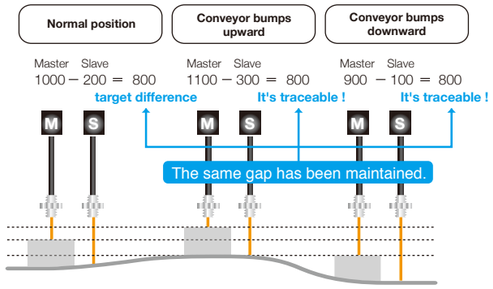
Differential Sensing Mode

A bumpy conveyor always makes stable detection difficult. The D2RF-T solves this problem with the Differential Sensing Mode. The Master and Slave amplifiers will calculate the difference between the reflection from the background and the target (see picture below). No matter how much the surface of the conveyor moves up and down the D2RF-T can follow the change and reliably detect the target.

Operation Flow:

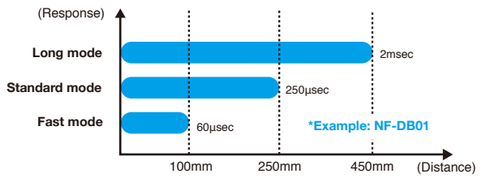


How to follow the changing condition!



Selectable Response Time

The Response time will affect the sensing distance.
The D2RF-T has three choices (Long, Standard, and Fast), select the response time based on the required sensing distance.
Long Mode boosts the power for the maximum sensing distance with a 2 msec. response time.
The Fast Mode has a reduced sensing distance but provides high speed 60µsec. response.



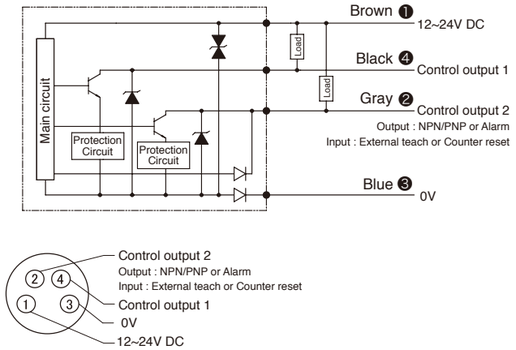
Long mode

Standard mode

Fast mode

Two Independent Outputs. Each output can be set separately.

The 2nd output can be configured as an external Teach input.



The operation of each output can be set to Light-On / Dark-On. Also, the Threshold level, Timer settings, etc. of each output can be set independently. The Analog output type (D2RF-TAN/P) provides a 4 ~ 20 mA (gray wire) analog output and a NPN (or PNP) digital output (black wire).

The second output can be configured as an Alarm output (self-diagnostic). It can also be set to operate as an External Teach Input or Counter Reset Input if the Counter function is being used.

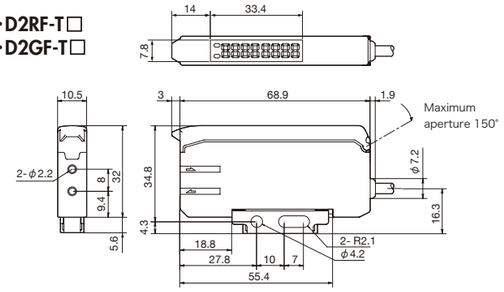
External Teach Input (CH2)

It is possible to have a Remote Teach Input if the CH2 output is re-assigned as an input.
When using the Remote Teach with Interconnected amplifiers all units will perform the Teach function simultaneously.
(This function is not available for Analogue Type)

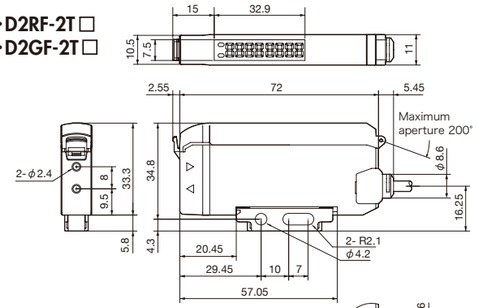
Dimensions

Stand-alone model

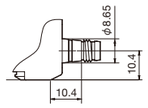
·D2RF-T□
·D2GF-T□



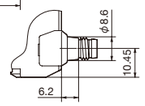
·D2RF-2T□
·D2GF-2T□



·D2RF-TC□4
·D2GF-TC□4

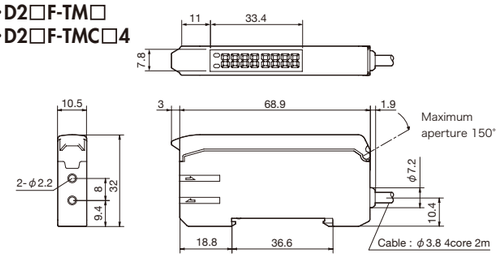


·D2RF-2TC□3/4
·D2GF-2TC□3/4

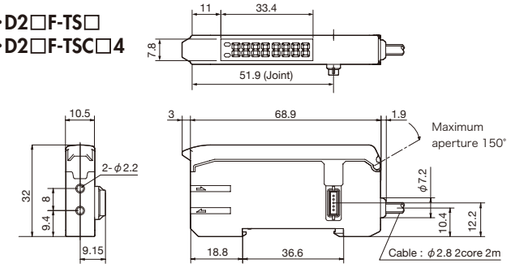


Interconnection model

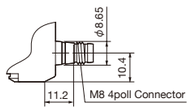
·D2□F-TM□
·D2□F-TMC□4



·D2□F-TS□
·D2□F-TSC□4

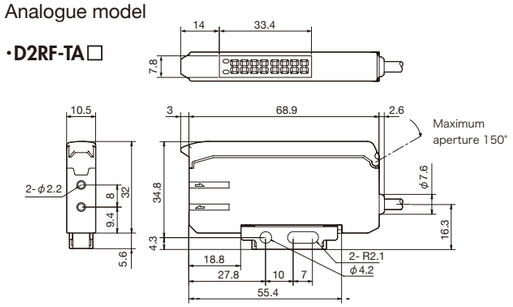


·M8 Connector type

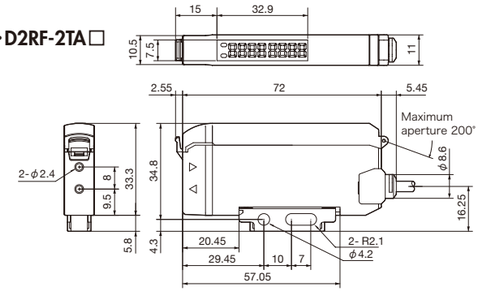


Analogue model

·D2RF-TA□



·D2RF-2TA□



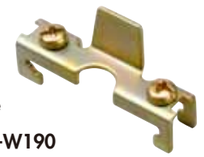
Specifications

Model		Standard	Mark sensor	Analogue
Stand-alone Type				
IP50 type	Cable type NPN / PNP	**D2RF-TN / TP**	**D2GF-TN / TP**	**D2RF-TAN / TAP**
	M8 QD 4pin, NPN / PNP	**D2RF-TCN4 / TCP4**	**D2GF-TCN4 / TCP4**	**NA**
IP66 type	Cable type NPN / PNP	**D2RF-2TN / 2TP**	**D2GF-2TN / 2TP**	**D2RF-2TAN / 2TAP**
	M8 QD 4pin, NPN / PNP	**D2RF-2TCN4 / 2TCP4**	**D2GF-2TCN4 / 2TCP4**	**NA**
	M8 QD 3pin, NPN / PNP	**D2RF-2TCN3 / 2TCP3**	**D2GF-2TCN3 / 2TCP3**	**NA**
Interconnection Type				
Master unit	Cable type NPN / PNP	**D2RF-TMN / TMP**	**D2GF-TMN / TMP**	**NA**
	M8 QD 4pin, NPN / PNP	**D2RF-TMCN4 / TMCP4**	**D2GF-TMCN4 / TMCP4**	**NA**
Slave unit	Cable type NPN / PNP	**D2RF-TSN / TSP**	**D2GF-TSN / TSP**	**NA**
	M8 QD 4pin, NPN / PNP	**D2RF-TSCN4 / TSCP4**	**D2GF-TSCN4 / TSCP4**	**NA**
Light source		Red LED	**Green LED**	**Red LED**
Response time		60 micro sec (Fast mode), 250 micro sec (standard), 2.0 ms (Long distance)		
Auto control system		APC / ASC		
LED Power control		3 steps ; 100%, 50% and 25%		
Timer functions		On delay/Off delay /One shot, 1-9,999msec (1msec increment)		
Sensitivity adjustment		Teach-in + fine adjustment		
Output indicator		Output (orange) : 1CH / 2CH common		Output (orange)
Digital indicator		7 segment LED, 4 digits in Red, 4 digits in Green		
Teach-in mode		Full Power / One point / Two points / Full Automatic / Differential / Zone / Transparent		
Control output		2CH, NPN or PNP open collector, DC30V, 100mA Max		1CH, NPN or PNP
Analogue output		NA		4-20mA, Resolution 0.1%FS
Parallel installation		Up to 16 sets		
Crosstalk prevention		Up to 4 sets		
Operating mode		Light on / Dark on selectable		
Sensing mode		Long Distance Mode, Standard, Fast mode,		
Display		Regular dislay plus ; bar, %, eco (off, run mode only)		
External input		Teaching / Counter Reset		
Supply voltage		DC 10-24V +/- 10% ripple		
Power consumption		45mA Max (24V)		
Circuit protection		Reverse Polarity, Overcurrent, Short circuit		
Warm-up time		100m sec		
Operating temp / humidity		–25 to 55℃, 35 to 85% RH		
Storage temp / humidity		–40 to 70℃, 35 to 85% RH		
Environmental illuminance		Sunlight 10,000 lux, High Frequency Lamp 3,000 lux		
Protection category		IEC, IP50 (except Stand-alone IP66 types)		
Comformity		IEC, CE		
Shock resistance		IEC 68, 50G		
Weight		Cable type 21g, M8 connector type 23g		
Factory default settings		Response time (Standard), Output (Light On), Timer (OFF), APC (OFF),		

Independent settings between CH1 and CH2 are possible at Threshold setting. Timer setting and Light/Dark setting.
Ambient Temperature is limited up to 50℃ when amplifires are connected in parallel over 4 pcs.

Options

End plate
BEF-EB01-W190



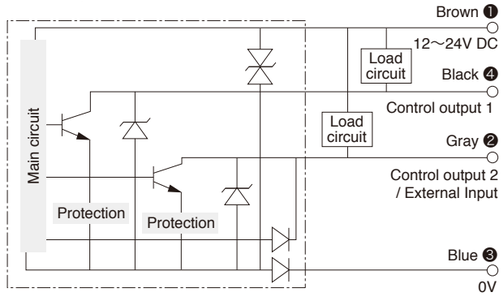
JCN-S : 2 meter
JCN-5S : 5 meter
JCN-10S : 10 meter
JCN-S : M8 Straight type

JCN-L : 2 meter
JCN-5L : 5 meter
JCN-10L : 10 meter
JCN-L : M8 L-shape type

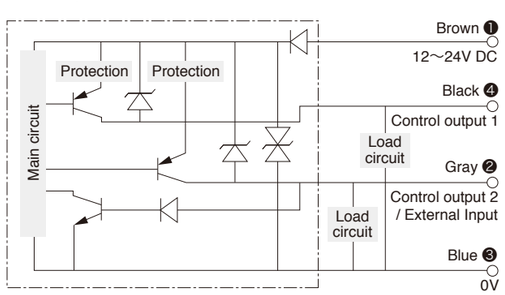
Circuit diagram

Stand-alone model

NPN output

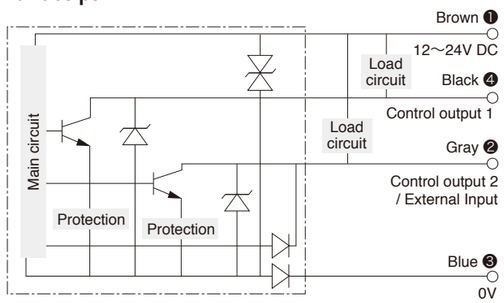


PNP output

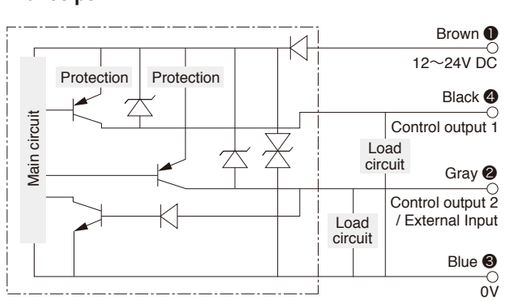


Interconnection model

NPN output



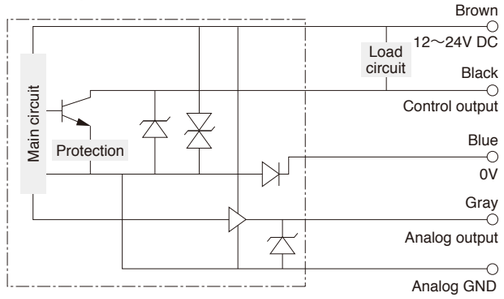
PNP output



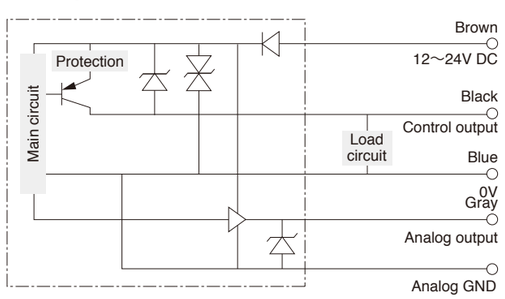
・Power wires (Brown ❶, Blue ❸) are not attached to Handset unit, both on cable and connector type.

Analogue model

NPN output



PNP output

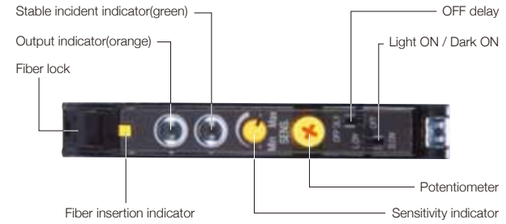


Fiber Sensor

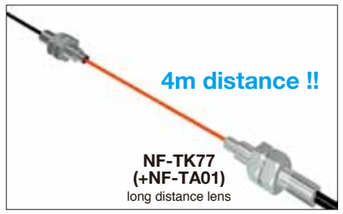
BRF series

- 3 models: Standard, High Speed, Mark Detection.
- High Speed type (50 micro sec) and Green LED type for Mark Sensing.
- Crosstalk prevention. IP66 protection.
- 10 turn adjustment potentiometer for fine tuning.

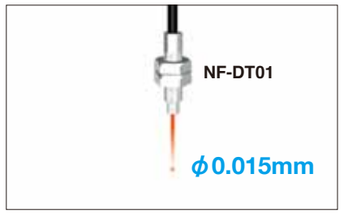
Part Identification



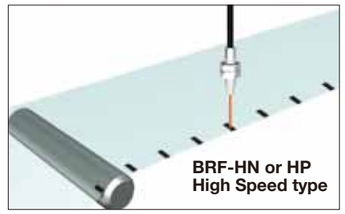
Long distance sensing



Min object φ0.015mm

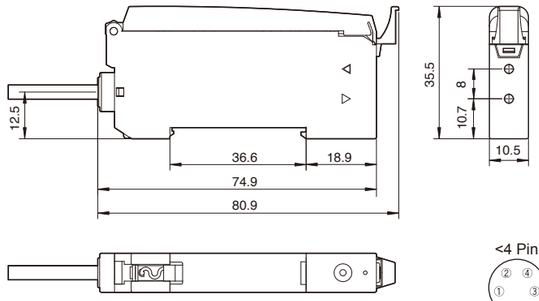


High Speed response 50μsec

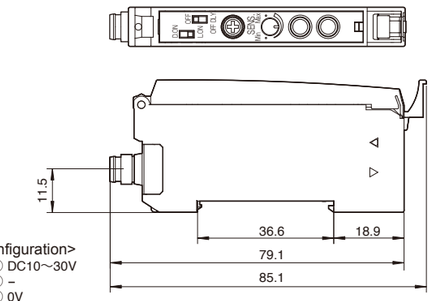


Dimensions

Cable Type Stand-alone



M8 Connector Stand-alone

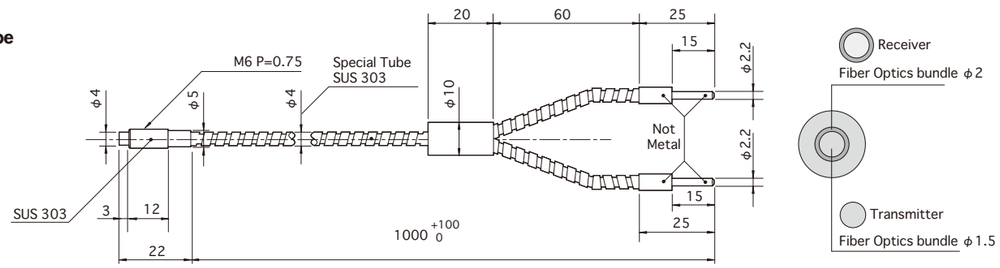


<4 Pin configuration>
① DC10~30V
② –
③ 0V
④ Control Output

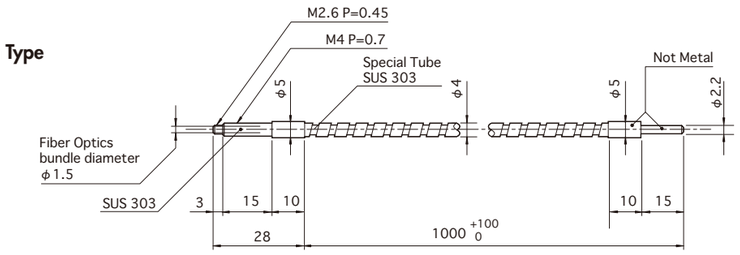
(Unit : mm)

Dimensions

NF-DW01
Diffuse Type



NF-TW01
Thru-beam Type



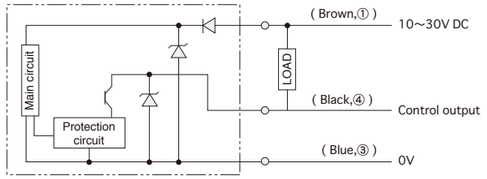
Specifications

Model		Standard type	High speed type	Mark type	Moisture type
Stand-alone	Cable type	BRF-N / P	BRF-HN / HP	BGF-N / P	BIF-WN / WP
	M8 QD type	BRF-CN / CP	BRF-CHN / CHP	BGF-CN / CP	BIF-CWN / CWP
Sensing distance (*1)	90% 250mm 200mm DK-06 Diffuse Fiber	150mm	50mm	40mm	30mm Diffuse 100mm Thru-beam
Response time		250 ms	50 μsec	250 ms	1msec
Control output		NPN or PNP Open Collector 100mA/DC30V max. 1.8V/100mA max.			
Light source		Red LED		Green LED	Infrared LED
LED Indicator	Stable output	Green			
	Output	Orange			
Potentiometer		10 turn			
Operating mode		Dark On/Light On selectable			
Timer		Off Delay 40msec fixed			
Supply voltage		DC10 ~ 30V Inc. 10% ripple			
Power consumption		25mA/30V (30mA/30V Interconnection type)			
Environmental illuminance	Sunlight	10,000 lx min.			
	Incandescent lamp	3,000 lx min.			
Operating temp		−25 ~ +55°C			
Operating humidity		35 ~ 85%			
Storage temp / humidity		−40 ~ +70°C/35 ~ 95%			
Insulation resistance		Min. 20MΩ/DC500V			
Conformity	EMC Test	CE regulation			
	Failen Test (house test)	Level 3			
Temperature drift		±5% max.			
LED Compensation ratio		−10% max./1000 h			
Vibration resisitance	IEC68	10 ~ 55Hz, 1.5mm			
Shock resistance	IEC68	500m/s2			
Protection category	Stand-alone	IP66			
	Interconnection	IP50			
Warm-up time		100ms max.			
Circuit protection		Overcurrent (output), Reverse Polarity, Short Circuit			
VED classification		Class 3			
Material	Housing	PBT G10			
	Cover	PC			
Dimensions		W10.5 x D80 x H35.5mm			
Regulation	UL	cRU recognition			
	CE	CE sign			

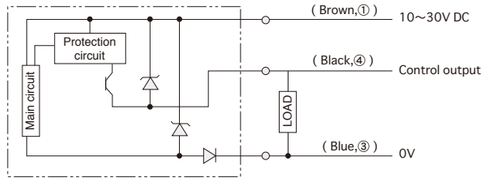
* 1 See NF series Fiber optics.

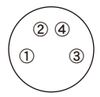
Circuit diagram

NPN output



PNP output





<4 Pin configuration>
① : DC10~30V ③ : 0V
② : - ④ : Control output

Options

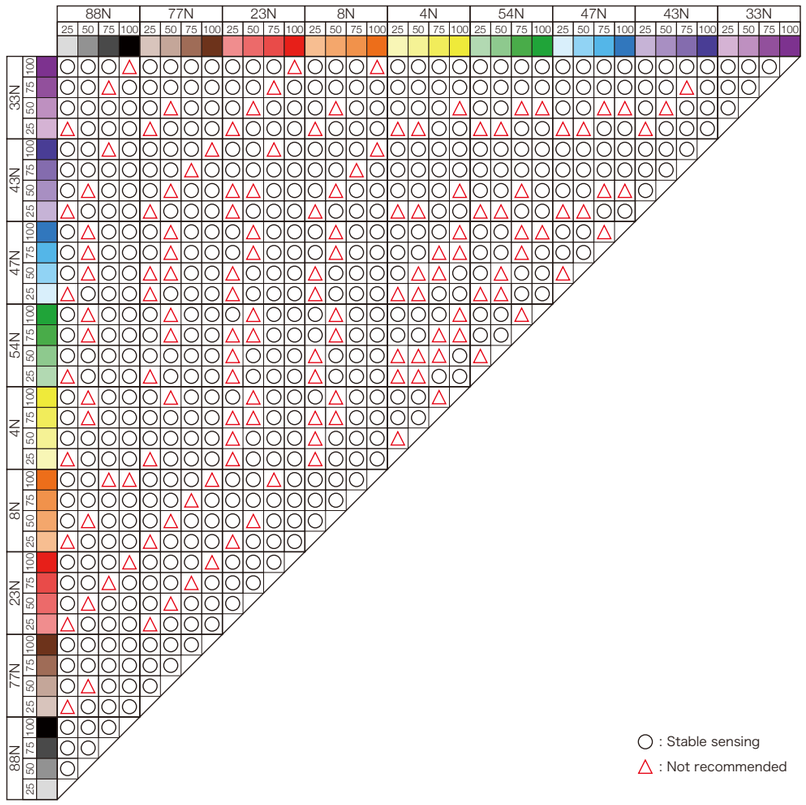
JCN-S : 2 meter
JCN-5S : 5 meter
JCN-10S : 10 meter

JCN-S：M8 Straight type

JCN-L : 2 meter
JCN-5L : 5 meter
JCN-10L : 10 meter

JCN-L：M8 L-shape type

Sensing Chart by colours (BGF series Mark Sensor)



Fiber unit NF series

A complete fiber optic sensor consists of the amplifier and a fiber optic cable.
The fiber optic cable is chosen based upon the specific application.
Optex-FA offers more than 80 different cables in both Thru-beam and Diffuse sensing modes.

Amplifiers
Various Shape for mounting
Flexible
Various Detecting Scheme
Environment-resistant
Liquid
Extension lens
Notes

EASY MOUNTING

Easy mounting by square body. Ideal for space saving.

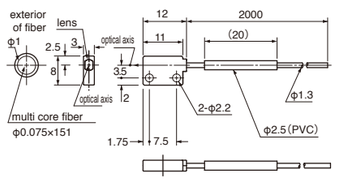
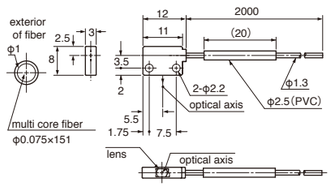
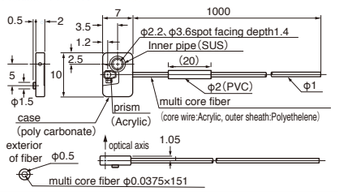
Head ON/Side ON switchable type

You can switch Head ON and Side ON changing fiber position.It helps reducing inventory and flexibleness R1mm helps you to mount easily.

Head ON, Side ON, Flat ON fixed type

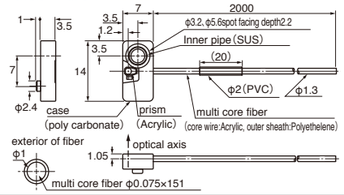
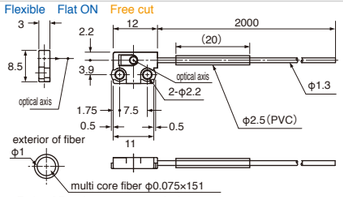
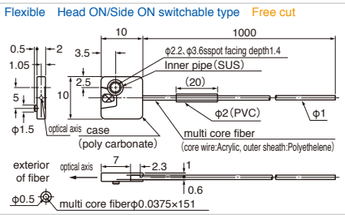
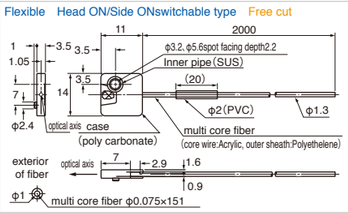
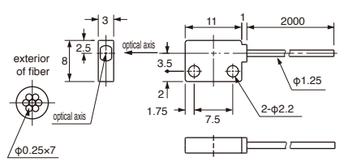
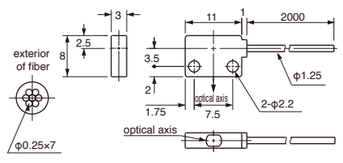
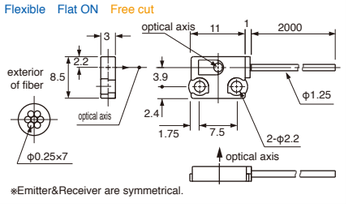
You can choose from Head ON, Side ON and Flat ON. You can also choose flexibleness from R1mm and R4mm as well

Specifications (Thru-beam Type : Standard)

	Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	Flexible Head ON Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,580 4-LG 3,060 3-ST 1,980 2-FS 1,350 1-HS 530	Long 2,700 Std 1,600 Fast 850	1,600	−40～60	R=1	NF-TR11
	Flexible Side ON Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,150 3-ST 2,000 2-FS 1,200 1-HS 540	Long 2,700 Std 1,500 Fast 1,000	1,300	−40～60	R=1	NF-TR12
	Flexible Flat ON Free cut 	7-EL 1,190 6-UL 1,120 5-PL 980 4-LG 850 3-ST 550 2-FS 310 1-HS 100	Long 600 Std 350 Fast 200	220	−40～60	R=1	NF-TE01

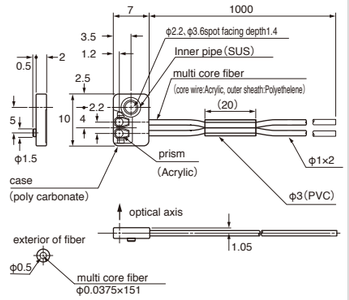
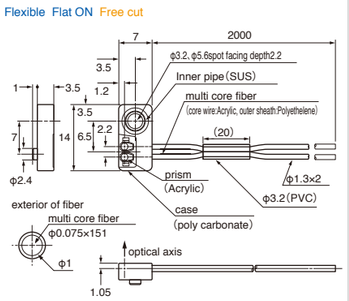
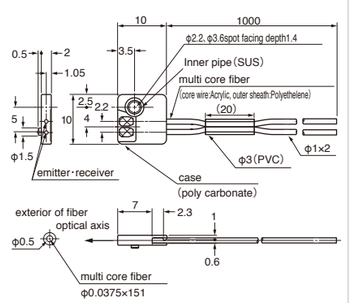
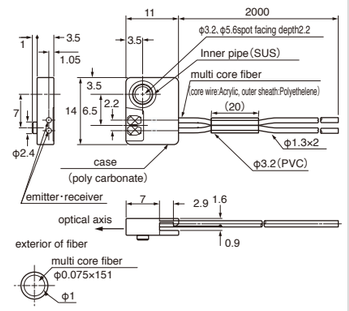
Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH

Specifications (Thru-beam Type : Standard)

	Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	Flexible Flat ON Free cut 	7-EL 1,890 6-UL 1,770 5-PL 1,540 4-LG 1,350 3-ST 880 2-FS 520 1-HS 170	Long 900 Std 500 Fast 350	450	−40～60	R=1	NF-TE03
	Flexible Flat ON Free cut  ※Emitter&Receiver are symmetrical.	7-EL 2,450 6-UL 2,300 5-PL 2,010 4-LG 1,710 3-ST 1,150 2-FS 650 1-HS 220	Long 1,200 Std 650 Fast 330	500	−40～60	R=1	NF-TR13
	Flexible Head ON/Side ON switchable type Free cut 	7-EL 430 6-UL 400 5-PL 350 4-LG 300 3-ST 190 2-FS 120 1-HS 36	Long 250 Std 120 Fast 55	110	−40～60	R=1	NF-TE02
	Flexible Head ON/Side ONswitchable type Free cut 	7-EL 1,340 6-UL 1,260 5-PL 1,090 4-LG 960 3-ST 630 2-FS 390 1-HS 130	Long 750 Std 450 Fast 250	280	−40～60	R=1	NF-TE04
	Flexible Head ON Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,580 4-LG 3,060 3-ST 1,980 2-FS 1,400 1-HS 500	Long 2,700 Std 1,600 Fast 850	1,100	−40～60	R=4	NF-TR06
	Flexible Side ON Free cut  ※Emitter&Receiver are symmetrical.	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,150 3-ST 2,000 2-FS 1,100 1-HS 320	Long 2,700 Std 1,300 Fast 600	1,100	−40～60	R=4	NF-TR05
	Flexible Flat ON Free cut  ※Emitter&Receiver are symmetrical.	7-EL 1,800 6-UL 1,510 5-PL 1,320 4-LG 1,150 3-ST 750 2-FS 410 1-HS 130	Long 750 Std 450 Fast 350	300	−40～60	R=4	NF-TE05

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

Specifications (Diffuse Type : Standard)

	Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Diffuse	Flexible Flat ON Free cut 	7-EL 140 6-UL 135 5-PL 110 4-LG 99 3-ST 70 2-FS 34 1-HS 10	Long 60 Std 30 Fast 10～16	30	−40～60	R=1	NF-DE01
	Flexible Flat ON Free cut 	7-EL 490 6-UL 450 5-PL 400 4-LG 350 3-ST 225 2-FS 117 1-HS 41	Long 250 Std 100 Fast 60	100	−40～60	R=1	NF-DE03
	Flexible Head ON/Side ON switchable type Free cut 	7-EL 160 6-UL 150 5-PL 130 4-LG 117 3-ST 77 2-FS 43 1-HS 12	Long 65 Std 35 Fast 20	30	−40～60	R=1	NF-DE02
	Flexible Head ON/Side ON switchable type Free cut 	7-EL 480 6-UL 450 5-PL 390 4-LG 340 3-ST 225 2-FS 117 1-HS 45	Long 250 Std 120 Fast 80	100	−40～60	R=1	NF-DE04

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.
Sensing distance of diffuse type is for 500 * 500mm white paper.

THREAD TYPE

Nut mounting in M3, M4, and M6. Optional lens provide larger distance of smaller objects.

Space saving

Thread type NF25-T and NF25-D have right angled head that helps to save space when you install. Heat resistant and R2mm flexible type are available.

Straight type

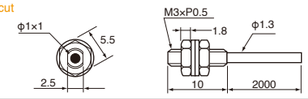
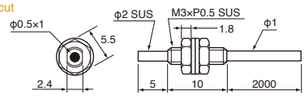
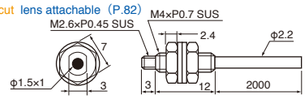
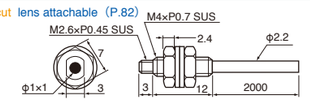
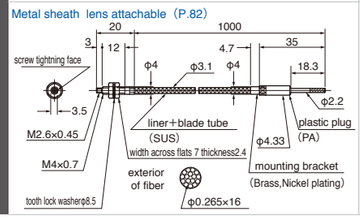
Nut type

Metal Sheath type

Stainless steal sheath strengthens durability against tension. Flexible R10mm even with metal sheath help your installation as well.

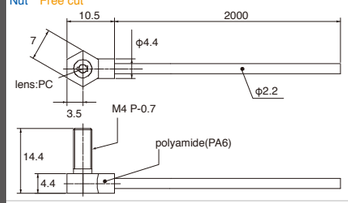
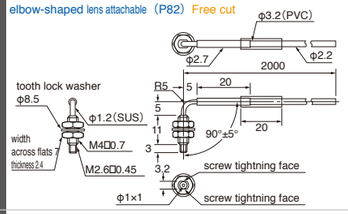
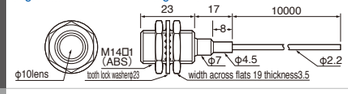
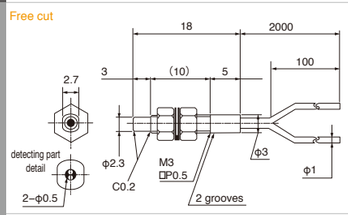
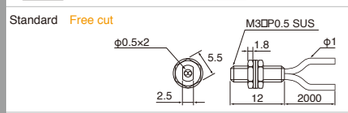
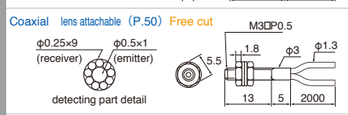
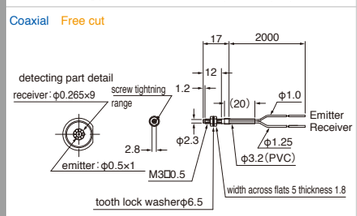
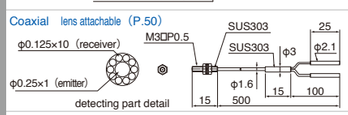
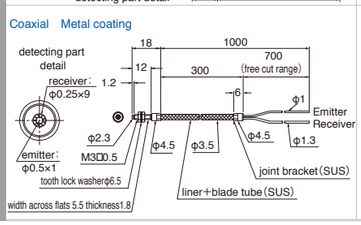
Metal sheath type

Specifications (Thru-beam Type : Standard)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	M3	Free cut 	7-EL 3,500 6-UL 2,100 5-PL 1,600 4-LG 1,400 3-ST 1,000 2-FS 550 1-HS 175	Long 1,000 Std 500 Fast 250	450	−40～70	R=25	NF-TM01
		Free cut 	7-EL 900 6-UL 550 5-PL 400 4-LG 350 3-ST 250 2-FS 140 1-HS 45	Long 350 Std 200 Fast 90	120	−40～70	R=15	NF-TM02
	M4	Free cut lens attachable (P.82) 	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 45	Long 1,800 Std 800 Fast 450	700	−40～70	R=30	NF-TB01
		Free cut lens attachable (P.82) 	7-EL 4,000 6-UL 2,000 5-PL 1,600 4-LG 1,400 3-ST 1,000 2-FS 550 1-HS 175	Long 1,000 Std 500 Fast 250	450	−40～70	R=25	NF-TB02
		Metal sheath lens attachable (P.82) 	7-EL 1,590 6-UL 1,440 5-PL 1,260 4-LG 1,140 3-ST 740 2-FS 410 1-HS 130	Long 350 Std 220 Fast 110	300	−40～60	R=10	NF-TJ01

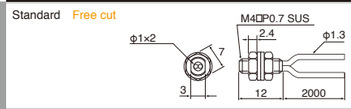
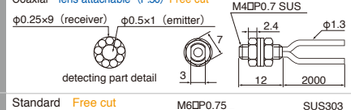
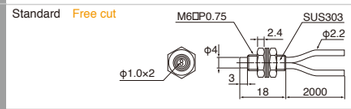
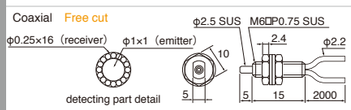
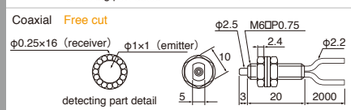
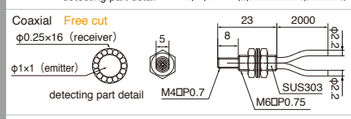
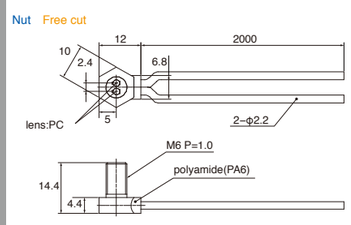
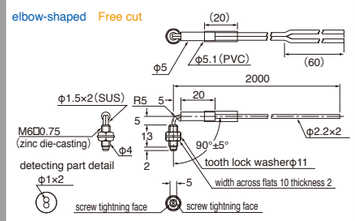
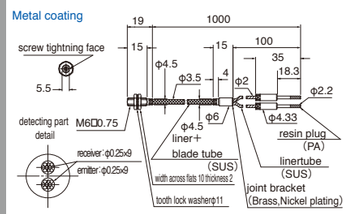
Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

Specifications (Thru-beam/Diffuse Type : Standard)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	M4	Nut Free cut 	7-EL 2,500 6-UL 1,400 5-PL 1,300 4-LG 1,000 3-ST 750 2-FS 350 1-HS 100	Long 800 Std 600 Fast 200	350	−40～70	R=25	NF25-T
		elbow-shaped lens attachable (P82) Free cut 	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	−40～70	R=25	NF-TB06
	M14	long distant detection with large lense Free cut 	7-EL 19,500 6-UL 19,500 5-PL 19,500 4-LG 19,500 3-ST 19,500 2-FS 19,500 1-HS 5,900	Long 19,500 Std 19,500 Fast 19,500	19,500	−40～70	R=25	NF-TB08
Diffuse	M3	Free cut 	7-EL 300 6-UL 160 5-PL 150 4-LG 120 3-ST 80 2-FS 40 1-HS 10	Long 100 Std 50 Fast 25	35	−40～70	R=15	FD-TT2
		Standard Free cut 	7-EL 400 6-UL 200 5-PL 190 4-LG 160 3-ST 100 2-FS 50 1-HS 10	Long 100 Std 60 Fast 30	45	−40～70	R=15	NF-DS06
		Coaxial lens attachable (P.50) Free cut 	7-EL 500 6-UL 300 5-PL 250 4-LG 225 3-ST 150 2-FS 100 1-HS 30	Long 250 Std 120 Fast 50	70	−40～70	R=15	NF-DT01
		Coaxial Free cut 	7-EL 310 6-UL 290 5-PL 260 4-LG 220 3-ST 140 2-FS 70 1-HS 20	Long 170 Std 80 Fast 45	55	−40～60	R=25	NF-DB07
		Coaxial lens attachable (P.50) 	7-EL 180 6-UL 110 5-PL 100 4-LG 85 3-ST 60 2-FS 40 1-HS 12	Long 70 Std 40 Fast 15	20	−40～70	R=15	NF-DK21
		Coaxial Metal coating 	7-EL 180 6-UL 170 5-PL 150 4-LG 130 3-ST 80 2-FS 40 1-HS 10	Long 120 Std 50 Fast 30	50	−40～60	R=10	NF-DJ01

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.
Sensing distance of diffuse type is for 500 * 500mm white paper.

Specifications (Difffuse Type : Standard)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Diffuse	M4	Standard Free cut 	7-EL 1,100 6-UL 650 5-PL 550 4-LG 450 3-ST 350 2-FS 200 1-HS 60	Long 400 Std 250 Fast 100	160	−40～70	R=25	NF-DM01
		Coaxial lens attachable (P.50) Free cut 	7-EL 500 6-UL 300 5-PL 250 4-LG 225 3-ST 150 2-FS 100 1-HS 30	Long 250 Std 120 Fast 50	70	−40～70	R=15	NF-DM02
		Standard Free cut 	7-EL 1,200 6-UL 750 5-PL 650 4-LG 550 3-ST 400 2-FS 250 1-HS 80	Long 400 Std 250 Fast 100	160	−40～70	R=25	NF-DK06
		Coaxial Free cut 	7-EL 1,200 6-UL 750 5-PL 650 4-LG 550 3-ST 400 2-FS 250 1-HS 75	Long 450 Std 250 Fast 100	150	−40～70	R=25	NF-DB01
		Coaxial Free cut 	7-EL 1,200 6-UL 750 5-PL 650 4-LG 575 3-ST 400 2-FS 250 1-HS 75	Long 450 Std 250 Fast 100	150	−40～70	R=25	NF-DB03
		Coaxial Free cut 	7-EL 1,200 6-UL 650 5-PL 550 4-LG 500 3-ST 300 2-FS 150 1-HS 50	Long 450 Std 250 Fast 100	80	−40～70	R=25	NF-DB04
Diffuse	M6	Nut Free cut 	7-EL 550 6-UL 330 5-PL 240 4-LG 200 3-ST 150 2-FS 90 1-HS 23	Long 120 Std 80 Fast 25	45	−40～70	R=25	NF25-D
		elbow-shaped Free cut 	7-EL 540 6-UL 510 5-PL 450 4-LG 390 3-ST 250 2-FS 140 1-HS 40	Long 300 Std 150 Fast 60	100	−40～70	R=25	NF-DB09
		Metal coating 	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	−40～70	R=10	NF-DJ02

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.
Sensing distance of diffuse type is for 500 * 500mm white paper.

CYLINDRICAL TYPE

Install by hollow set screw.
Space saving fiber unit.

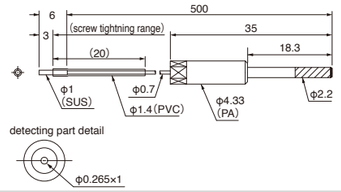
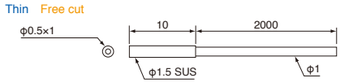
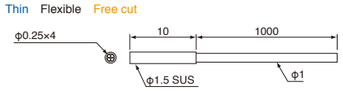
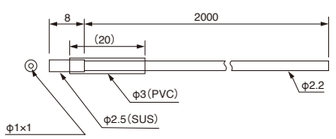
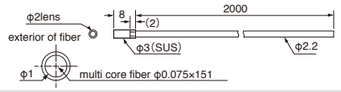
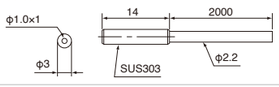
You can choose one from three types

Super narrow type

Side beam type

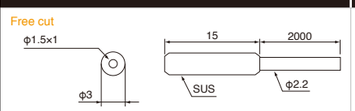
Sleeve type

Specifications (Thru-beam Type : Standard)

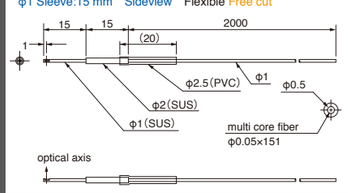
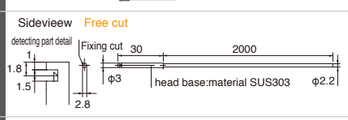
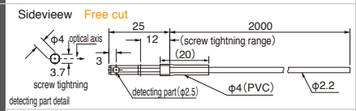
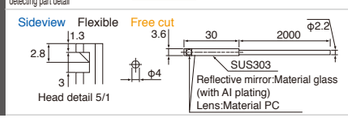
		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	ϕ1	Thin Flexible 	7-EL 54 6-UL 50 5-PL 44 4-LG 38 3-ST 25 2-FS 15 1-HS 5	Long 30 Std 18 Fast 8	10	−40～60	R=4	NF-TR04
	ϕ1.5	Thin Free cut 	7-EL 900 6-UL 550 5-PL 400 4-LG 350 3-ST 250 2-FS 140 1-HS 45	Long 350 Std 200 Fast 90	120	−40～70	R=15	NF-TM03
		Thin Flexible Free cut 	7-EL 850 6-UL 550 5-PL 450 4-LG 400 3-ST 275 2-FS 150 1-HS 50	Long 350 Std 200 Fast 90	110	−40～70	R=4	NF-TR03
	ϕ2.5	Free cut 	7-EL 1,710 6-UL 1,530 5-PL 1,350 4-LG 1,230 3-ST 800 2-FS 480 1-HS 160	Long 900 Std 550 Fast 250	350	−40～70	R=25	NF-TB07
	ϕ3	Lens attached Flexible Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,150 4-LG 2,790 3-ST 1,800 2-FS 1,000 1-HS 340	Long 2,300 Std 1,300 Fast 550	550	−40～60	R=1	NF-TR10
		Flexible Free cut 	7-EL 4,000 6-UL 2,000 5-PL 1,600 4-LG 1,400 3-ST 1,000 2-FS 550 1-HS 180	Long 800 Std 400 Fast 200	360	−40～70	R=2	NF-TK05

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

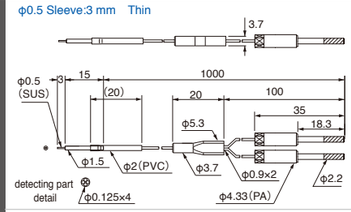
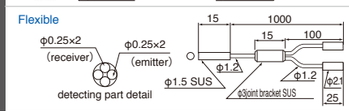
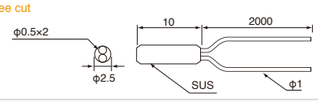
Specifications (Thru-beam Type : Standard)

	Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam ϕ3	Free cut 	7-EL 4,000 6-UL 3,000 5-PL 2,400 4-LG 2,100 3-ST 1,500 2-FS 800 1-HS 220	Long 1,800 Std 800 Fast 450	700	−40～70	R=30	NF-TS07

Specifications (Thru-beam Type : Sideview)

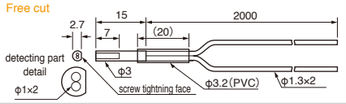
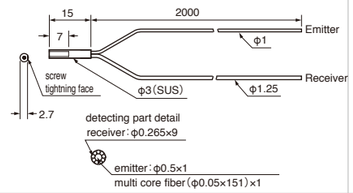
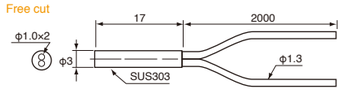
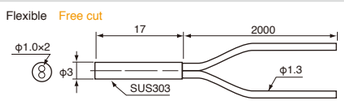
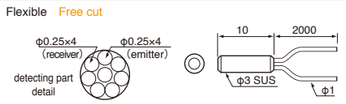
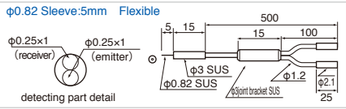
		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam Side	ϕ2	ϕ1 Sleeve:15 mm Sideview Flexible Free cut 	7-EL 160 6-UL 150 5-PL 130 4-LG 110 3-ST 76 2-FS 45 1-HS 11	Long 90 Std 50 Fast 25	20	−40～60	R=1	NF-TG05
	ϕ3	Sideview Free cut 	7-EL 2,500 6-UL 1,900 5-PL 1,300 4-LG 1,100 3-ST 800 2-FS 400 1-HS 140	Long 800 Std 400 Fast 200	180	−40～70	R=25	NF-TS08
	ϕ4	Sideview Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,240 3-ST 2,100 2-FS 1,600 1-HS 530	Long 2,800 Std 2,000 Fast 1,000	1,000	−40～60	R=25	NF-TV08
		Sideview Flexible Free cut 	7-EL 3,500 6-UL 3,500 5-PL 3,500 4-LG 3,000 3-ST 2,000 2-FS 1,000 1-HS 300	Long 1,800 Std 1,000 Fast 500	700	−40～70	R=1	NF-TS22V

Specifications (Diffuse Type : Standard)

	Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Diffuse ϕ1.5	ϕ0.5 Sleeve:3 mm Thin 	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 N.A.	3	−40～60	R=10	NF-DP01
	Flexible 	7-EL 300 6-UL 180 5-PL 150 4-LG 130 3-ST 80 2-FS 45 1-HS 18	Long 70 Std 30 Fast 15	20	−40～70	R=4	NF-DR04
ϕ2.5	Free cut 	7-EL 400 6-UL 200 5-PL 190 4-LG 160 3-ST 100 2-FS 50 1-HS 10	Long 100 Std 60 Fast 30	45	−40～70	R=15	NF-DT03

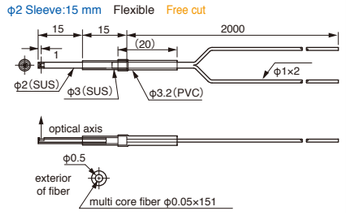
Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.
Sensing distance of diffuse type is for 500 * 500mm white paper.

Specifications (Diffuse Type : Standard)

	Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Diffuse φ3	Free cut 	7-EL 690 6-UL 640 5-PL 560 4-LG 490 / 3-ST 320 2-FS 120 1-HS 60	Long 400 Std 200 Fast 100	150	−40～70	R=25	NF-DB10
	Coaxial Flexible Free cut 	7-EL 270 6-UL 250 5-PL 210 4-LG 180 3-ST 120 2-FS 60 1-HS 20	Long 120 Std 70 Fast 35	55	−40～60	R=2	NF-DR11
	Free cut 	7-EL 1,200 6-UL 750 5-PL 650 4-LG 550 / 3-ST 400 2-FS 250 1-HS 80	Long 400 Std 250 Fast 100	160	−40～70	R=25	NF-DK04
	Flexible Free cut 	7-EL 850 6-UL 550 5-PL 450 4-LG 375 / 3-ST 275 2-FS 170 1-HS 55	Long 300 Std 180 Fast 90	110	−40～70	R=2	NF-DK04Z
	Flexible Free cut 	7-EL 450 6-UL 250 5-PL 190 4-LG 160 / 3-ST 120 2-FS 70 1-HS 25	Long 120 Std 50 Fast 25	35	−40～70	R=4	NF-DR03
	φ0.82 Sleeve:5mm Flexible 	7-EL 190 6-UL 125 5-PL 75 4-LG 65 / 3-ST 45 2-FS 25 1-HS 8	Long 40 Std 15 Fast 5	10	−40～70	R=4	NF-DR05

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.
Sensing distance of diffuse type is for 500 * 500mm white paper.

Specifications (Diffuse Type : Sideview)

	Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Diffuse φ3	φ2 Sleeve:15 mm Flexible Free cut 	7-EL 53 6-UL 50 5-PL 43 4-LG 36 3-ST 20 2-FS 12 1-HS 4	Long 25 Std 12 Fast 5	10	−40～60	R=1	NF-DR12

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.
Sensing distance of diffuse type is for 500 * 500mm white paper.

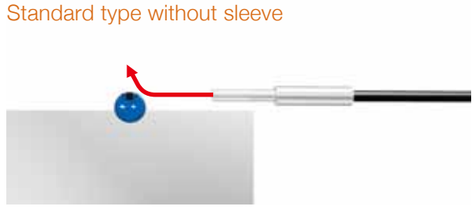
SLEEVE-STRAIGHT

Fine heads that you select between cylindrical and screw types provide convenience in installation even in narrow space.

You can mount flexibly

Sleeve type enables position adjustment after installation.

Standard type without sleeve



Sleeve type

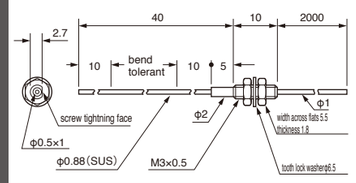
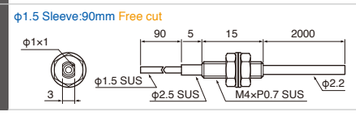
Easy adjusting position

Sleeve type is easy to adjust position even in narrow space without hiding object by itself.

Without sleeve

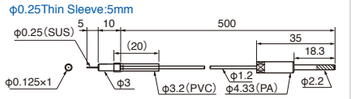
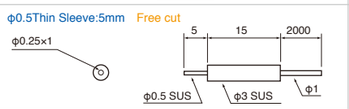
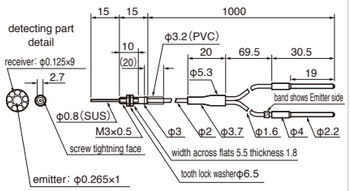
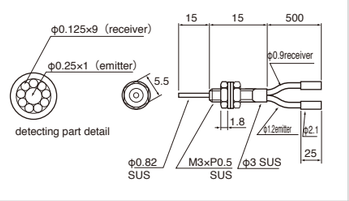
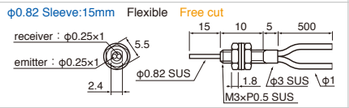
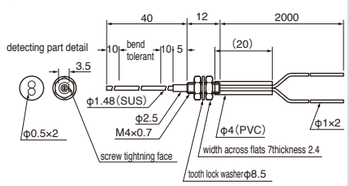
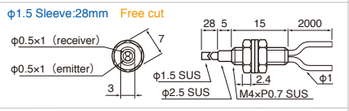
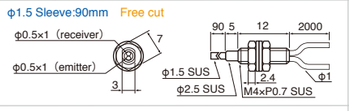
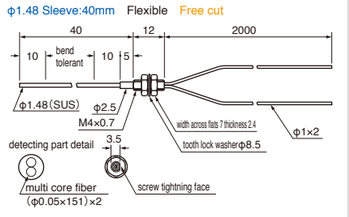
Sleeve type

Specifications (Thru-beam Type : Standard)

	Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam M3	φ0.88 Sleeve:40mm Free cut 	7-EL 270 6-UL 250 5-PL 210 4-LG 180 3-ST 120 2-FS 60 1-HS 20	Long 120 Std 70 Fast 35	55	−40～70	Fiber R=25 Sleeve R=10	NF-TB05
Thru-beam M4	φ1.5 Sleeve:90mm Free cut 	7-EL 1,200 6-UL 750 5-PL 650 4-LG 550 / 3-ST 400 2-FS 250 1-HS 80	Long 400 Std 250 Fast 100	160	−40～70	Fiber R=25 Sleeve R=15	NF-TB03

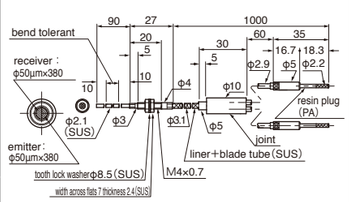
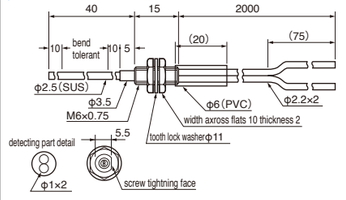
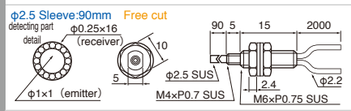
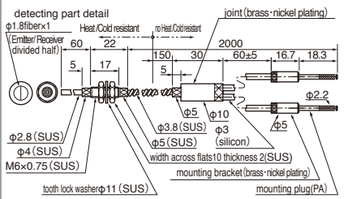
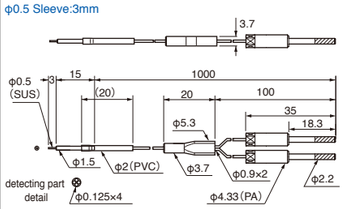
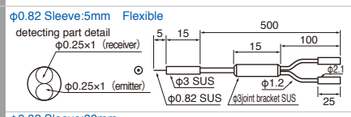
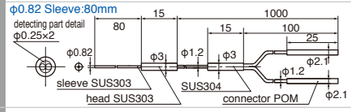
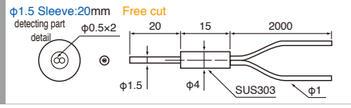
Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

Specifications (Thru-beam/Diffufse Type : Standard)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	φ3	φ0.25Thin Sleeve:5mm 	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	−40～70	R=5	NF-TP01
		φ0.5Thin Sleeve:5mm Free cut 	7-EL 170 6-UL 110 5-PL 80 4-LG 70 3-ST 50 2-FS 25 1-HS 8	Long 80 Std 40 Fast 20	30	−40～70	R=15	NF-TT01
Diffuse	M3	φ0.8 Sleeve:15mm Coaxial 	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	−40～60	R=25	NF-DB05
		φ0.82 Sleeve:15mm Flexible Coaxial 	7-EL 240 6-UL 120 5-PL 100 4-LG 85 3-ST 60 2-FS 35 1-HS 10	Long 70 Std 40 Fast 15	15	−40～70	R=4	NF-DT04
		φ0.82 Sleeve:15mm Flexible Free cut 	7-EL 190 6-UL 125 5-PL 70 4-LG 65 3-ST 45 2-FS 25 1-HS 8	Long 40 Std 15 Fast 5	10	−40～70	R=4	NF-DT02
	M4	φ1.48 Sleeve:40mm Free cut 	7-EL 195 6-UL 180 5-PL 160 4-LG 140 3-ST 90 2-FS 50 1-HS 15	Long 110 Std 50 Fast 30	40	−40～70	Fiber R=25 Sleeve R=10	NF-DB08
		φ1.5 Sleeve:28mm Free cut 	7-EL 450 6-UL 240 5-PL 220 4-LG 190 3-ST 120 2-FS 60 1-HS 16	Long 100 Std 60 Fast 30	45	−40～70	R=15	NF-DT05
		φ1.5 Sleeve:90mm Free cut 	7-EL 450 6-UL 240 5-PL 220 4-LG 190 3-ST 120 2-FS 60 1-HS 16	Long 120 Std 50 Fast 30	45	−40～70	Fiber R=15 Sleeve R=10	NF-DM03
		φ1.48 Sleeve:40mm Flexible Free cut 	7-EL 140 6-UL 135 5-PL 110 4-LG 95 3-ST 65 2-FS 30 1-HS 10	Long 60 Std 35 Fast 17	30	−40～60	Fiber R=1 Sleeve R=10	NF-DR10

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.
Sensing distance of diffuse type is for 500 * 500mm white paper.

Specifications (Diffuse Type : Standard)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Diffuse	M4	φ2.1 Sleeve:90mm Heat Proof 	7-EL 1,110 6-UL 1,050 5-PL 910 4-LG 800 3-ST 520 2-FS 190 1-HS 50	Long 750 Std 250 Fast 80	200	−30～350 or −60～200	Fiber R=25 Sleeve R=10	NF-DH05
	M6	φ2.5 Sleeve:40mm Free cut 	7-EL 680 6-UL 630 5-PL 550 4-LG 480 3-ST 320 2-FS 180 1-HS 50	Long 400 Std 240 Fast 110	130	−40～70	Fiber R=25 Sleeve R=10	NF-DB06
		φ2.5 Sleeve:90mm Free cut 	7-EL 1,100 6-UL 750 5-PL 750 4-LG 650 3-ST 450 2-FS 300 1-HS 80	Long 450 Std 250 Fast 100	150	−40～70	Fiber R=25 Sleeve R=20	NF-DB02
		φ2.8 Sleeve:60mm Heat resistant 	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	−30～350 or −60～200	Fiber R=25 Sleeve R=10	NF-DH04
	φ1.5	φ0.5 Sleeve:3mm 	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 N.A.	3	−40～60	R=10	NF-DP01
	φ3	φ0.82 Sleeve:5mm Flexible 	7-EL 190 6-UL 125 5-PL 75 4-LG 65 3-ST 45 2-FS 25 1-HS 8	Long 40 Std 15 Fast 5	10	−40～70	R=4	NF-DR05
		φ0.82 Sleeve:80mm 	7-EL 90 6-UL 50 5-PL 45 4-LG 40 3-ST 25 2-FS 10 1-HS 4	Long 35 Std 18 Fast 10	7	−40～70	R=25	NF-DR07
	φ4	φ1.5 Sleeve:20mm Free cut 	7-EL 400 6-UL 200 5-PL 190 4-LG 160 3-ST 100 2-FS 50 1-HS 16	Long 100 Std 60 Fast 12	45	−40～70	R=15	NF-DK43

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.
Sensing distance of diffuse type is for 500 * 500mm white paper.

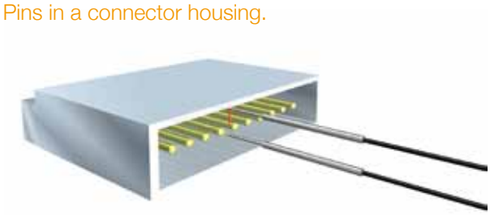
SLEEVE-SIDEVIEW

90° angle beam enables detection in a limited narrow space.

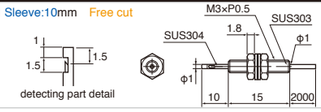
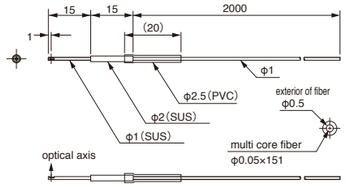
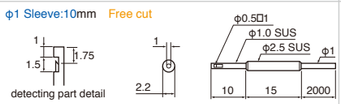
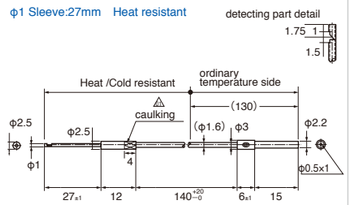
You can detect objects in narrow area.

Sleeve – side beam type enables installation in very narrow complicated object. Effectively it can detect very small pins in a connector for example.

Pins in a connector housing.

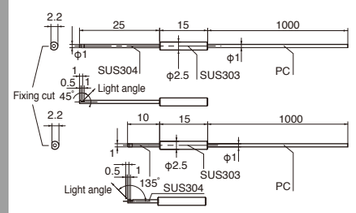
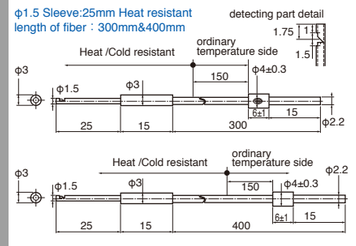
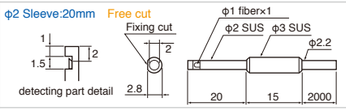
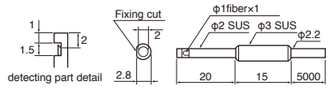
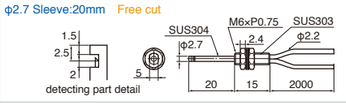
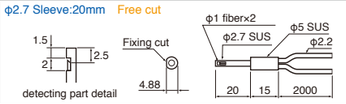
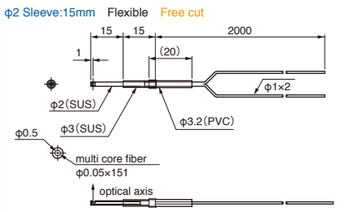
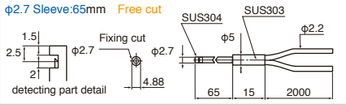
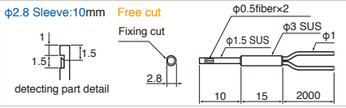


Specifications (Thru-beam Type : Sideview)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	M3	φ1 Sleeve:10mm Free cut 	7-EL 650 6-UL 450 5-PL 300 4-LG 250 / 3-ST 200 2-FS 100 1-HS 25	Long 200 Std 150 Fast 60	75	−40～70	R=15	NF-TV04
	φ2	φ1 Sleeve:15mm Flexible Free cut 	7-EL 160 6-UL 150 5-PL 130 4-LG 110 3-ST 76 2-FS 45 1-HS 11	Long 90 Std 50 Fast 25	20	−40～60	R=1	NF-TG05
		φ1 Sleeve:10mm Free cut 	7-EL 650 6-UL 450 5-PL 300 4-LG 250 / 3-ST 200 2-FS 100 1-HS 25	Long 200 Std 150 Fast 60	75	−40～70	R=15	NF-TV02
	φ2.5	φ1 Sleeve:27mm Heat resistant 	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	−40～200	R=30	NF-TH04S-27V2

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

Specifications (Thru-beam/Diffuse Type : Sideview)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Diffuse	φ2.5	φ1 Sleeve:25mm&10mm 45°oblique light axis Heat resistant Free cut 	7-EL 100 6-UL 55 5-PL 50 4-LG 40 3-ST 30 2-FS 10 1-HS 4	Long 28 Std 20 Fast 15	16	−40～105	R=10	NF-TH06
	φ3	φ1.5 Sleeve:25mm Heat resistant length of fiber : 300mm&400mm 	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	−40～200	R=30	NF-TH05S-A
		φ2 Sleeve:20mm Free cut 	7-EL 2,000 6-UL 1,300 5-PL 1,000 4-LG 900 / 3-ST 600 2-FS 300 1-HS 100	Long 800 Std 400 Fast 200	320	−40～70	R=25	NF-TV01
		φ2 Sleeve:20mm Free cut 5 m Free cut 	7-EL 1,700 6-UL 1,100 5-PL 850 4-LG 750 / 3-ST 500 2-FS 250 1-HS 85	Long 600 Std 300 Fast 150	200	−40～70	R=25	NF-TV01-5
Thru-beam	M6	φ2.7 Sleeve:20mm Free cut 	7-EL 680 6-UL 400 5-PL 350 4-LG 300 / 3-ST 200 2-FS 100 1-HS 30	Long 200 Std 120 Fast 50	90	−40～70	R=25	NF-DV03
	φ3	φ2.7 Sleeve:20mm Free cut 	7-EL 680 6-UL 400 5-PL 350 4-LG 300 / 3-ST 200 2-FS 100 1-HS 30	Long 200 Std 120 Fast 50	90	−40～70	R=25	NF-DV01
		φ2 Sleeve:15mm Flexible Free cut 	7-EL 53 6-UL 50 5-PL 43 4-LG 36 3-ST 20 2-FS 12 1-HS 4	Long 25 Std 12 Fast 5	10	−40～60	R=1	NF-DR12
	φ5	φ2.7 Sleeve:65mm Free cut 	7-EL 230 6-UL 110 5-PL 85 4-LG 75 / 3-ST 55 2-FS 30 1-HS 8	Long 80 Std 30 Fast 7	15	−40～70	R=25	NF-DK33
		φ2.8 Sleeve:10mm Free cut 	7-EL 680 6-UL 400 5-PL 350 4-LG 300 / 3-ST 200 2-FS 100 1-HS 30	Long 200 Std 120 Fast 50	90	−40～70	R=15	NF-DV02

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.
Sensing distance of diffuse type is for 500 * 500mm white paper.

FLEXIBLE R4mm

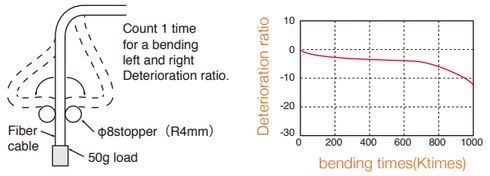
You can mount this flexible fiber unit on a robot arm that moves continuously.

Stands over 800,000 times of bending test.

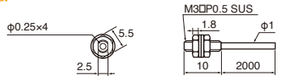
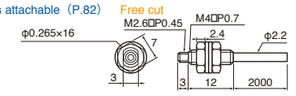
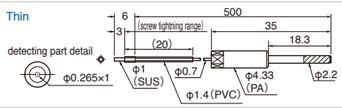
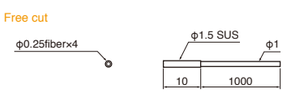
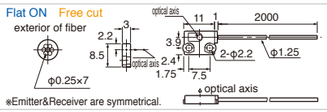
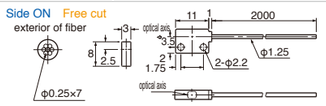
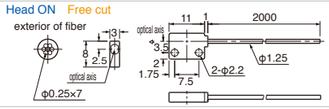
Deterioration is less than 10% even after 800,000 times of bending tests at 90 deg. R4mm under 50g load.
Good for mounting on a robot arm.

Test conditions are :

- Bending speed: 30time/minutes
- Angle: +/- 90 deg. Per bending
- Count one time for a bending left and right

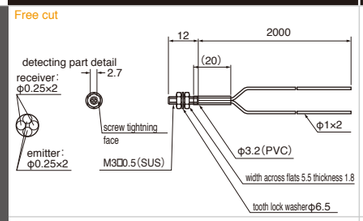
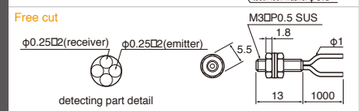
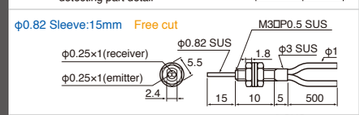
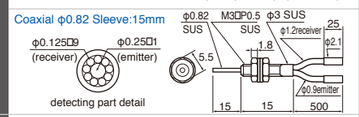
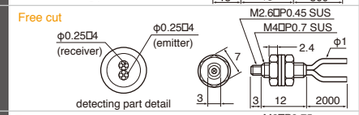
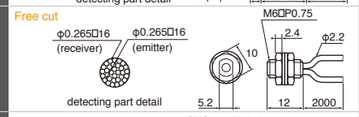
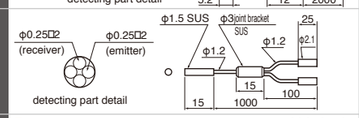
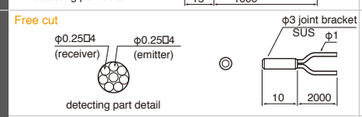
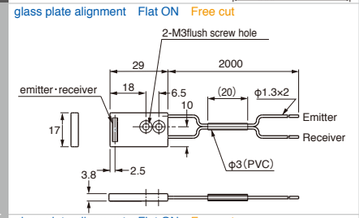
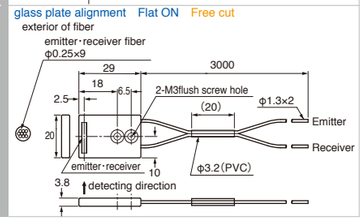


Specifications (Thru-beam)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	M3	Free cut 	7-EL 850 6-UL 550 5-PL 450 4-LG 400	3-ST 275 2-FS 150 1-HS 50	Long 350 Std 200 Fast 90	110	−40～70	R=4	NF-TR02
	M4	Lens attachable（P.82） Free cut 	7-EL 4,000 6-UL 1,800 5-PL 1,400 4-LG 1,200	3-ST 850 2-FS 500 1-HS 175	Long 800 Std 400 Fast 250	330	−40～70	R=4	NF-TR01
	φ1	Thin 	7-EL 54 6-UL 50 5-PL 44 4-LG 38	3-ST 25 2-FS 15 1-HS 5	Long 30 Std 18 Fast 8	10	−40～60	R=4	NF-TR04
	φ1.5	Thin Free cut 	7-EL 850 6-UL 550 5-PL 450 4-LG 400	3-ST 275 2-FS 150 1-HS 50	Long 350 Std 200 Fast 90	110	−40～70	R=4	NF-TR03
	角形	Flat ON Free cut exterior of fiber  ※Emitter&Receiver are symmetrical.	7-EL 1,600 6-UL 1,510 5-PL 1,320 4-LG 1,150	3-ST 750 2-FS 410 1-HS 130	Long 750 Std 450 Fast 280	300	−40～60	R=4	NF-TE05
		Side ON Free cut exterior of fiber 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,150	3-ST 2,000 2-FS 1,100 1-HS 320	Long 2,700 Std 1,300 Fast 600	1,100	−40～60	R=4	NF-TR05
		Head ON Free cut exterior of fiber 	7-EL 3,600 6-UL 3,600 5-PL 3,580 4-LG 3,060	3-ST 1,980 2-FS 1,400 1-HS 500	Long 2,700 Std 1,800 Fast 850	1,100	−40～60	R=4	NF-TR06

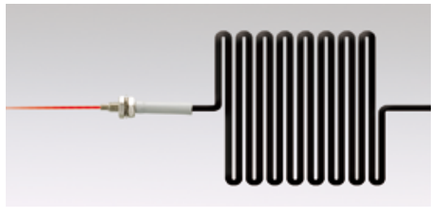
Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH
Sensing distance of diffuse type is for 500 * 500mm white paper.

Specifications (Diffuse/Limited Diffuse)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Diffuse	M3	Free cut 	7-EL 88 6-UL 80 5-PL 70 4-LG 60 3-ST 40 2-FS 20 1-HS 7		Long 40 Std 20 Fast 14	20	−40～70	R=4	NF-DR08
		Free cut 	7-EL 300 6-UL 180 5-PL 130 4-LG 100	3-ST 80 2-FS 45 1-HS 16	Long 70 Std 30 Fast 15	20	−40～70	R=4	NF-DR02
		φ0.82 Sleeve:15mm Free cut 	7-EL 190 6-UL 125 5-PL 70 4-LG 65	3-ST 45 2-FS 25 1-HS 8	Long 40 Std 15 Fast 5	10	−40～70	R=4	NF-DT02
		Coaxial φ0.82 Sleeve:15mm 	7-EL 240 6-UL 120 5-PL 100 4-LG 85	3-ST 60 2-FS 35 1-HS 10	Long 70 Std 40 Fast 15	15	−40～70	R=4	NF-DT04
	M4	Free cut 	7-EL 300 6-UL 180 5-PL 140 4-LG 120	3-ST 80 2-FS 45 1-HS 16	Long 120 Std 50 Fast 25	35	−40～70	R=4	NF-DR06
	M6	Free cut 	7-EL 1,100 6-UL 700 5-PL 600 4-LG 500	3-ST 350 2-FS 230 1-HS 70	Long 350 Std 200 Fast 80	130	−40～70	R=4	NF-DR01
	φ1.5	Free cut 	7-EL 300 6-UL 180 5-PL 150 4-LG 130	3-ST 80 2-FS 45 1-HS 18	Long 70 Std 30 Fast 15	20	−40～70	R=4	NF-DR04
	φ3	Free cut 	7-EL 450 6-UL 250 5-PL 190 4-LG 160	3-ST 1,120 2-FS 70 1-HS 25	Long 120 Std 50 Fast 25	35	−40～70	R=4	NF-DR03
		φ0.82 Sleeve:5mm Free cut 	7-EL 190 6-UL 125 5-PL 75 4-LG 65	3-ST 45 2-FS 25 1-HS 8	Long 40 Std 15 Fast 5	10	−40～70	R=4	NF-DR05
Limited Diffuse	Square	glass plate alignment Flat ON Free cut 	7-EL 0～23 6-UL 0～23 5-PL 0～22 4-LG 0～22 3-ST 0～21 2-FS 0～20 1-HS 5～13		Long 0～23 Std 0～17 Fast 0～12	15	0 ～70	R=4	NF-DC06
		glass plate alignment Flat ON Free cut exterior of fiber 	7-EL 0～38 6-UL 0～38 5-PL 0～38 4-LG 0～38 3-ST 0～34 2-FS 0～31 1-HS 4～22		Long 0～36 Std 0～30 Fast 0～15	使用不可	0 ～70	R=4	NF-DC04

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

FlEXIBLE R1mm



You don't have to care about how it bends when you mount the fiber.

You don't have to care mounting

When you need bend resistant type, please use Bend-tolerant fibers on page 22.

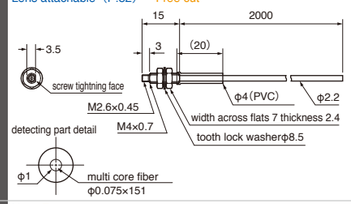
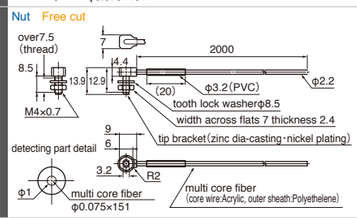
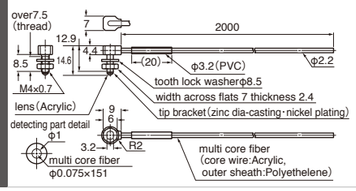
Standard fiber cable

Bend-tolerance is not big so it may break when you mount bending it.

Flexible fiber cable

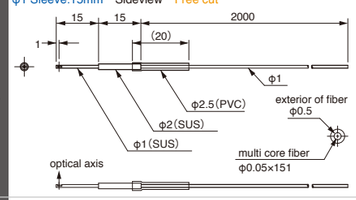
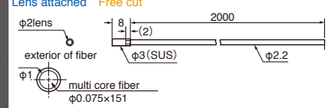
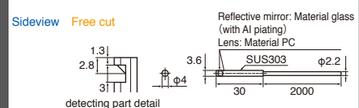
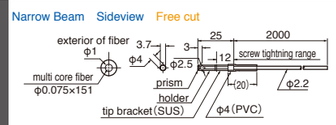
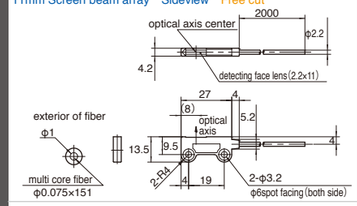
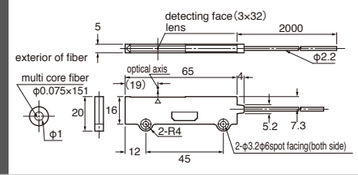
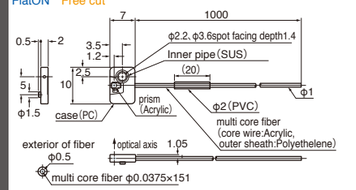
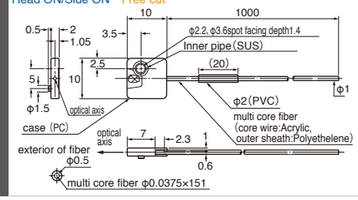
You can mount the flexible fiber cable very neatly because of its flexibility.

Specifications (Thru-beam)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	M4	Lens attachable (P.82) Free cut 	7-EL 4,000 6-UL 2,000 5-PL 1,600 4-LG 1,400 3-ST 1,000 2-FS 550 1-HS 180	Long 800 Std 400 Fast 200	360	−40～60	R=1	NF-TK77
	M5	Nut Free cut 	7-EL 1,530 6-UL 1,440 5-PL 1,260 4-LG 1,000 3-ST 720 2-FS 420 1-HS 140	Long 800 Std 450 Fast 250	300	−40～60	R=1	NF-TR08
	M6	Nut Lens attached Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,150 3-ST 1,980 2-FS 1,000 1-HS 320	Long 2,300 Std 1,300 Fast 550	800	−40～60	R=1	NF-TR09

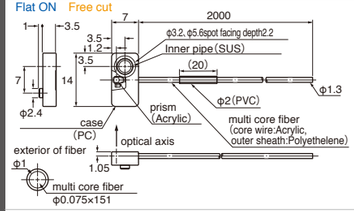
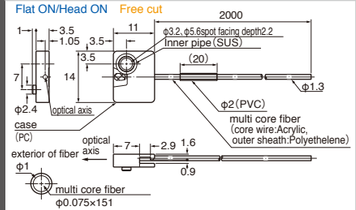
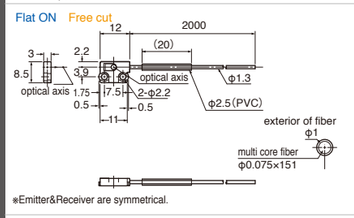
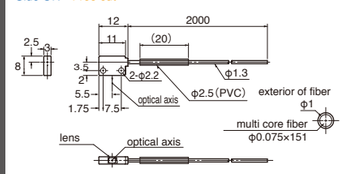
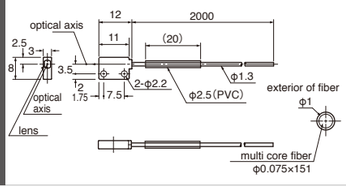
Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

Specifications (Thru-beam)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	φ2	φ1 Sleeve:15mm Sideview Free cut 	7-EL 160 6-UL 150 5-PL 130 4-LG 110 3-ST 76 2-FS 45 1-HS 11	Long 90 Std 50 Fast 25	20	−40～60	R=1	NF-TG05
	φ3	Lens attached Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,150 4-LG 2,790 / 3-ST 1,800 2-FS 1,000 1-HS 340	Long 2,300 Std 1,300 Fast 550	550	−40～60	R=1	NF-TR10
	φ4	Sideview Free cut 	7-EL 3,500 6-UL 3,500 5-PL 3,500 4-LG 3,500 / 3-ST 2,000 2-FS 1,000 1-HS 300	Long 1,800 Std 1,000 Fast 500	700	−40～70	R=1	NF-TS22V
	φ5	Narrow Beam Sideview Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,300 / 3-ST 2,100 2-FS 1,500 1-HS 520	Long 2,500 Std 1,600 Fast 800	1,000	−40～60	R=1	NF-TG02
	Screen	11mm Screen beam array Sideview Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,240 3-ST 2,100 2-FS 2,100 1-HS 850	Long 3,500 Std 3,000 Fast 1,500	1,800	−40～55	R=1	NF-TZ03
		32mm Screen beam array Sideview Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,600 3-ST 3,600 2-FS 3,600 1-HS 2,000	Long 3,500 Std 3,500 Fast 3,500	3,500	−40～55	R=1	NF-TZ01
	Square	FlatON Free cut 	7-EL 1,190 6-UL 1,120 5-PL 980 4-LG 850 3-ST 550 2-FS 310 1-HS 100	Long 600 Std 350 Fast 200	220	−40～60	R=1	NF-TE01
		Head ON/Side ON Free cut 	7-EL 430 6-UL 400 5-PL 350 4-LG 300 3-ST 190 2-FS 120 1-HS 36	Long 250 Std 120 Fast 55	110	−40～60	R=1	NF-TE02

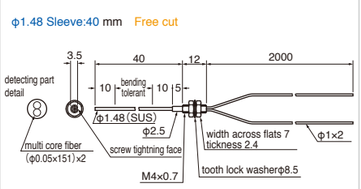
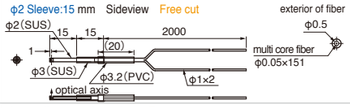
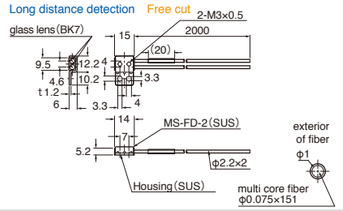
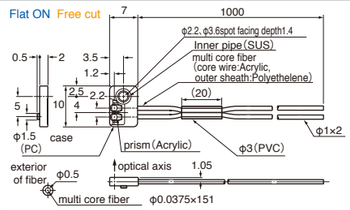
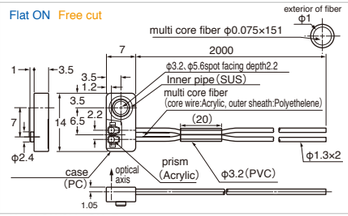
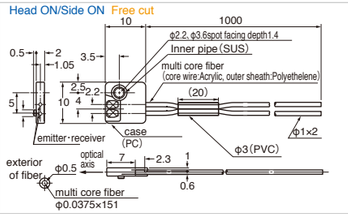
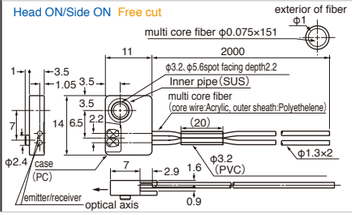
Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

Specifications (Thru-beam)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	Square	Flat ON Free cut 	7-EL 1,890 6-UL 1,770 5-PL 1,540 4-LG 1,350 3-ST 880 2-FS 520 1-HS 170	Long 900 Std 500 Fast 350	450	−40～60	R=1	NF-TE03
		Flat ON/Head ON Free cut 	7-EL 1,340 6-UL 1,260 5-PL 1,090 4-LG 960 3-ST 630 2-FS 390 1-HS 130	Long 750 Std 450 Fast 250	300	−40～60	R=1	NF-TE04
		Flat ON Free cut  ※Emitter&Receiver are symmetrical.	7-EL 2,450 6-UL 2,300 5-PL 2,010 4-LG 1,710 3-ST 1,150 2-FS 650 1-HS 220	Long 1,200 Std 650 Fast 330	500	−40～60	R=1	NF-TR13
		Side ON Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,150 3-ST 2,000 2-FS 1,200 1-HS 540	Long 2,700 Std 1,500 Fast 1,000	1,300	−40～60	R=1	NF-TR12
		Head ON Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,580 4-LG 3,060 3-ST 1,980 2-FS 1,350 1-HS 530	Long 2,700 Std 1,600 Fast 850	1600	−40～60	R=1	NF-TR11

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

Specifications (Diffuse)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Diffuse	M4	φ1.48 Sleeve:40 mm Free cut 	7-EL 140 6-UL 135 5-PL 110 4-LG 95 3-ST 65 2-FS 30 1-HS 10	Long 60 Std 35 Fast 17	30	−40～60	Fiber R=1 Sleeve R=10	NF-DR10
	φ3	φ2 Sleeve:15 mm Sideview Free cut 	7-EL 53 6-UL 50 5-PL 43 4-LG 36 3-ST 20 2-FS 12 1-HS 4	Long 25 Std 12 Fast 5	10	−40～60	R=1	NF-DR12
	Square	Long distance detection Free cut 	7-EL 1,070 6-UL 990 5-PL 880 4-LG 770 3-ST 500 2-FS 310 1-HS 90	Long 600 Std 380 Fast 200	250	−40～60	R=1	NF-DR09
		Flat ON Free cut 	7-EL 140 6-UL 135 5-PL 110 4-LG 99 3-ST 70 2-FS 34 1-HS 10	Long 60 Std 30 Fast 10～16	30	−40～60	R=1	NF-DE01
		Flat ON Free cut 	7-EL 490 6-UL 450 5-PL 400 4-LG 350 3-ST 225 2-FS 117 1-HS 41	Long 250 Std 100 Fast 60	100	−40～60	R=1	NF-DE03
		Head ON/Side ON Free cut 	7-EL 160 6-UL 150 5-PL 130 4-LG 117 3-ST 77 2-FS 43 1-HS 12	Long 65 Std 35 Fast 20	30	−40～60	R=1	NF-DE02
		Head ON/Side ON Free cut 	7-EL 480 6-UL 450 5-PL 390 4-LG 340 3-ST 225 2-FS 117 1-HS 45	Long 250 Std 120 Fast 80	100	−40～60	R=1	NF-DE04

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.
Sensing distance of diffuse type is for 500 * 500mm white paper.

FLEXIBLE R2mm

Flexibility of the fiber and the right angled head shape make installation very easy.

Space saving and flexible mounting

Please use flexible R2mm type with thread when you need space saving and easy installation. We have thru-beam type and diffuse type.

Thru-beam
NF02-TK

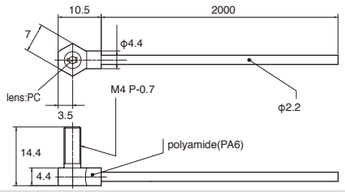
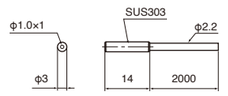
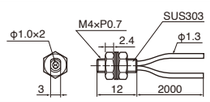
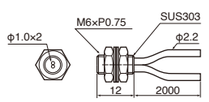
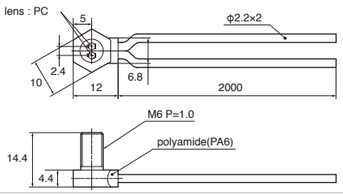
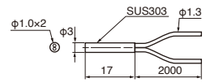
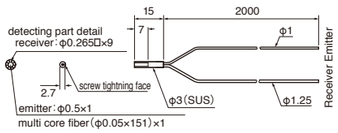
Diffuse
NF02-DK

Straight type

Threaded right angle type

Thread type can be installed saving space.

Specifications (Thru-beam/Diffuse)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	M4	Nut Free cut 	7-EL 2,000 6-UL 1,000 5-PL 950 4-LG 800 3-ST 550 2-FS 250 1-HS 80	Long 600 Std 500 Fast 150	270	−40～70	R=2	NF02-TK
	ϕ3	Free cut 	7-EL 4,000 6-UL 2,000 5-PL 1,600 4-LG 1,400 3-ST 1,000 2-FS 550 1-HS 180	Long 800 Std 400 Fast 200	360	−40～70	R=2	NF-TK05
Diffuse	M 4	Free cut 	7-EL 1,200 6-UL 750 5-PL 650 4-LG 550 3-ST 400 2-FS 250 1-HS 80	Long 300 Std 180 Fast 80	110	−40～70	R=2	NF-DK66
	M 6	Free cut 	7-EL 1,200 6-UL 750 5-PL 650 4-LG 550 3-ST 400 2-FS 250 1-HS 80	Long 300 Std 180 Fast 80	110	−40～70	R=2	NF-DK67
		Nut Free cut lens : PC 	7-EL 550 6-UL 330 5-PL 230 4-LG 200 3-ST 150 2-FS 90 1-HS 18	Long 65 Std 45 Fast 10	15	−40～70	R=2	NF02-DK
	ϕ3	Free cut 	7-EL 850 6-UL 550 5-PL 450 4-LG 375 3-ST 275 2-FS 170 1-HS 55	Long 65 Std 45 Fast 10	110	−40～70	R=2	NF-DK04Z
		Coaxial Free cut 	7-EL 270 6-UL 250 5-PL 210 4-LG 180 3-ST 120 2-FS 80 1-HS 20	Long 120 Std 70 Fast 35	55	−40～60	R=2	NF-DR11

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.
Sensing distance of diffuse type is for 500 * 500mm white paper.

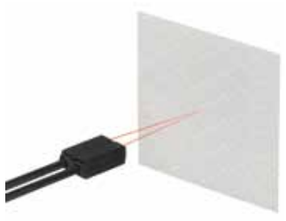
RETRO-REFLECTIVE

- Retro-reflective type for detecting transparent object.
- Super thin type for wafer mapping.

Detects transparent object

NF-RR01 can detect transparent object without affection from glossy glass or tilted surface because of its polarizing filter built in. Narrow view type NF-RB01 and NF-RB02 are available as well.

NF-RR01



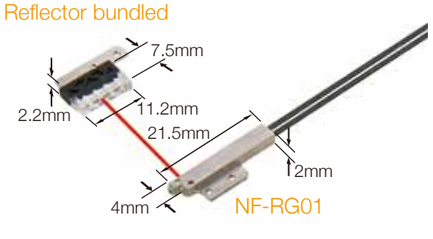
NF-RB01

NF-RB02

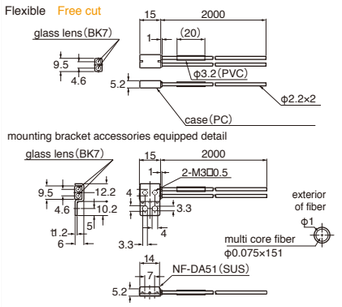
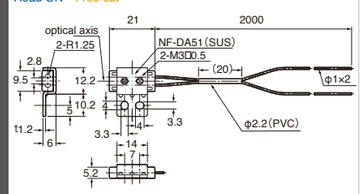
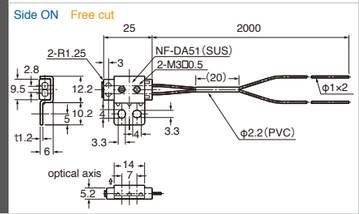
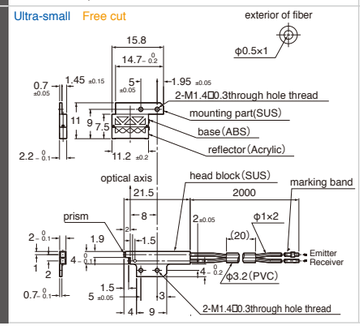
Wafer mapping

Super thin 2mm height Retro-reflective type enables wafer mapping saving space.

Reflector bundled



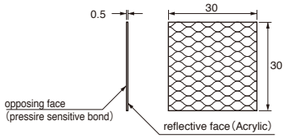
Specifications (Polarizing Filter Built in/Narrow Beam/Wafer Mapping)

	Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Polarized filter built in	Flexible Free cut 	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 10～550	600	−25～55	R=1	NF-RR01
Narrow beam	Head ON Free cut 	7-EL 440 6-UL 410 5-PL 360 4-LG 310 3-ST 200 2-FS 170 1-HS 95	Long 250 Std 200 Fast 200	200	−40～60	R=10	NF-RB01
	Side ON Free cut 	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	−40～60	R=10	NF-RB02
Wafer mapping	Ultra-small Free cut 	7-EL 590 6-UL 550 5-PL 480 4-LG 420 3-ST 270 2-FS 180 1-HS 70	Long 350 Std 230 Fast 130	N.A.	−40～60	R=10	NF-RG01

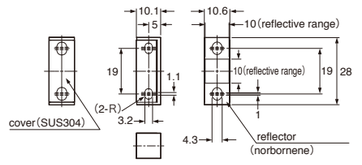
Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

Reflector dimentions

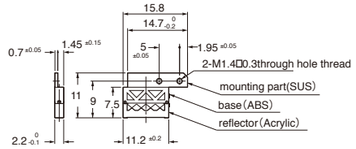
DG3030
(Standard accessory for NF-RR01)



P31
(Standard accessory for NF-RB01, -RB02)



Reflector for NF-RG01
(Standard accessory for NF-RG01)



CONVERGENT BEAM

You can detect very small object utilizing small focused spot beam.

Detects small object by fine spot focus beam

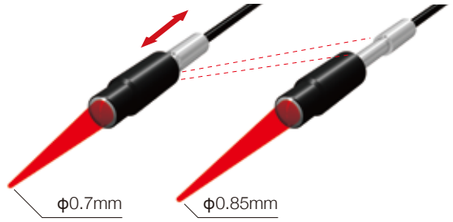
Fine spot lens NF-DA03 and coaxial diffuse fiber unit NF-DK21 enables 0.2mm Dia. Spot.

Coaxial diffuse fiber unit NF-DK21

Adjustable spot size

You can adjust spot size, 0.7~0.85mm, by changing length of fiber inserted in the lens NF-DA06, 20 +/- 1.5mm. Space saving Side-beam type NF-DA07 is available.

Adjustable spot size



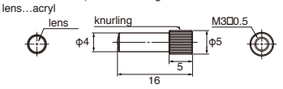
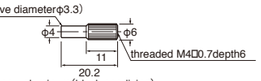
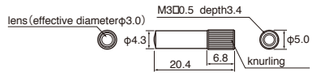
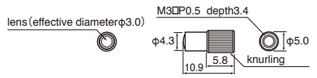
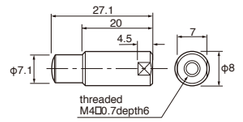
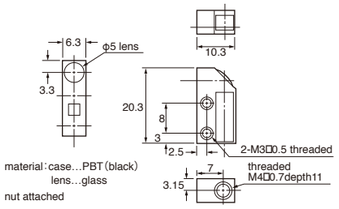
Detects small object by fine fiber core

0.125mm Dia. fiber core is built in NF-TP01 and NF-DP01 that enables detecting small object. It has sleeve that helps easy position adjust.

NF-TP01 Thru-beam

NF-DP01 Diffuse

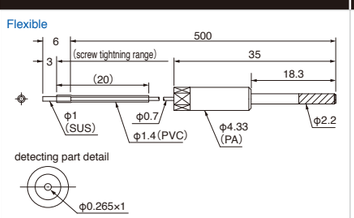
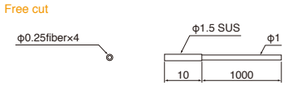
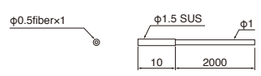
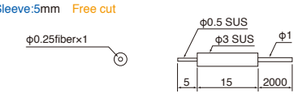
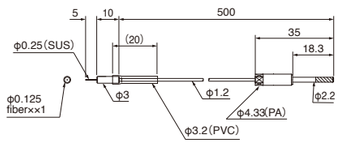
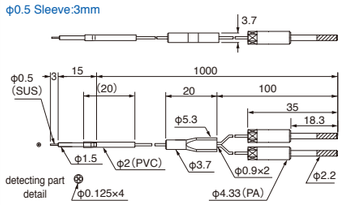
Specifications (Diffuse)

	Sensing head	Spot Size and applicable fibers (Min. detected object in parenthesized)	Center sensing distance (unit=mm)	Operation temperature (℃～℃)	Part Number
Very small spot	material：case…aluminum (black anodizing) lens…acryl 	ϕ0.2mm @ NF-DK21 ϕ0.4mm @ NF-DT01 (ϕ0.005mm gold-coated wire)	7	−20～60	NF-DA03
Very small spot	material：case…aluminum (black anodizing) lens…acryl 	ϕ0.3mm @ NF-DK21 ϕ0.5mm @ NF-DT01 (ϕ0.005mm gold-coated wire)	7.5	−40～70	NF-DA04
Small spot	lens（effective diameterϕ3.3）  material：case…aluminum（black anodizing） lens…glass	ϕ0.5mm @ NF-DM02 (ϕ0.005mm gold-coated wire)	6	−40～70	NF-DA05
Small spot	lens（effective diameterϕ3.0） 	ϕ0.2mm @ NF-DK21 (ϕ0.005 gold-coated wire) ϕ0.4mm @ NF-DT01 (ϕ0.01mm gold-coated wire)	6	−40～70	NF-DA01
Small spot	lens（effective diameterϕ3.0） 	ϕ1.2mm @ NF-DK21 (ϕ0.005mm gold-coated wire) ϕ1.4mm @ NF-DT01 (ϕ0.01mm gold-coated wire)	15	−40～70	NF-DA02
Spot size adjust lens	 material：case…aluminum (black anodizing) lens…glass	ϕ0.7mm - 0.85mm @ NF-DM02 (ϕ0.2mm gold-coated wire)	about 20	−40～70	NF-DA06
Spot size adjust lens side view	 material：case…PBT (black) lens…glass nut attached	ϕ0.5mm - 0.8mm @ NF-DM02 (ϕ0.1mm gold-coated wire)	about 14	−40～70	NF-DA07

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

Tiny and fine objects detected with Diffuse type fibers become easier for detection under higher sensitivity by longer response time or by boosted power of emitter.

Specifications (Thru-beam/Diffuse)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃~℃)	Radius (mm)	Part Number
Thru-beam	ϕ1	Flexible 	7-EL 54 6-UL 50 5-PL 44 4-LG 38 3-ST 25 2-FS 15 1-HS 5	Long 30 Std 18 Fast 8	10	−40～60	R=4	NF-TR04
	ϕ1.5	Flexible Free cut 	7-EL 850 6-UL 550 5-PL 450 4-LG 400 3-ST 275 2-FS 150 1-HS 50	Long 350 Std 200 Fast 90	110	−40～70	R=4	NF-TR03
		Free cut 	7-EL 900 6-UL 550 5-PL 400 4-LG 350 3-ST 250 2-FS 140 1-HS 45	Long 350 Std 200 Fast 90	120	−40～70	R=15	NF-TM03
	ϕ3	ϕ0.5 Sleeve:5mm Free cut 	7-EL 170 6-UL 110 5-PL 80 4-LG 70 3-ST 50 2-FS 140 1-HS 45	Long 80 Std 40 Fast 20	30	−40～70	R=15	NF-TT01
		ϕ0.25 Super-slim Sleeve:5mm 	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	−40～70	R=5	NF-TP01
Diffuse	ϕ1.5	ϕ0.5 Sleeve:3mm 	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 N.A.	3	−40～60	R=10	NF-DP01

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

SCREEN BEAM ARRAY

NF-TS40 series

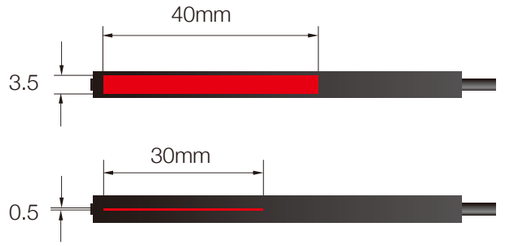
40 x 3.5mm Beam Array type with SUS (stainless steel) mounting metal.

SUS (stainless steel) mounting

A rugged Stainless Steel mounting enables tough tightening of mounting position without breaking the mounting hole.

Adjustable line beam

40 x 3.5mm area of Beam Array is possible to change by using optional slit that limits the array into 30 x 0.5mm



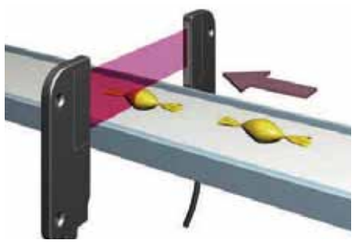
Fine sensing of 0.4mm diameter

Clear optical system of NF-TS40 assures 0.4mm of diameter to detect in 3500mm distance of sensing (with D3RF amplifier)

Applications

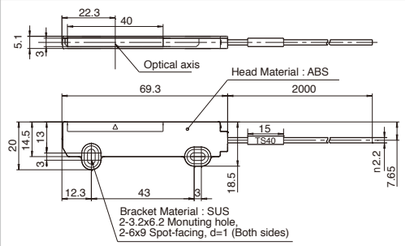
Control of dropping pills

Control of meandering sheet



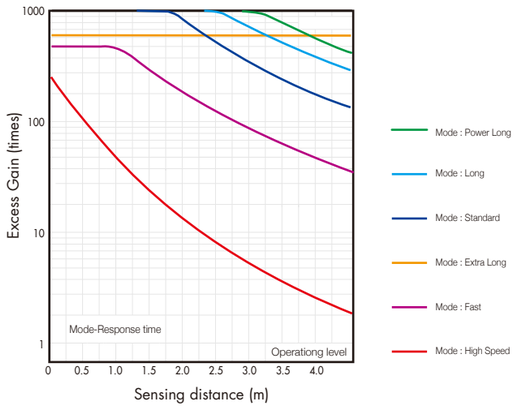
Counting on a conveyor

Specifications (Thru-beam/Diffuse)

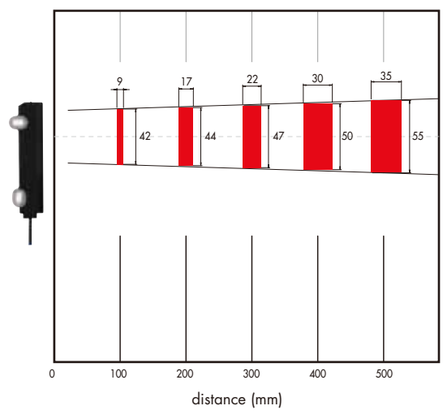
Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃~℃)	Radius (mm)	Part Number
	7-EL 3,500 6-UL 3,500 5-PL 3,500 4-LG 3,500 3-ST 3,500 2-FS 3,000 1-HS 2,500	Long 3,600 Std 3,600 Fast 3,600	300	−40~70	R=2	NF-TS40

Model	NF-TS40
Sensing Range (D3RF amplifier)	0 - 4mm
Spot Size	ϕ4mm @ 4mm
Bending Radius	R10
Fiber Lengfth	2000mm Free cut
Ambient Temp	−40~+60℃
Storage Temp	−40~+70℃
Demensions (W □ D □ H)	12 □ 18 □ 4.3 mm
Material	Base , Cover : PC Fiber : PMMA
Torque	3kgfcm max.
Weight	7g

Excess Gain Curves (Typical Value)



Spot size

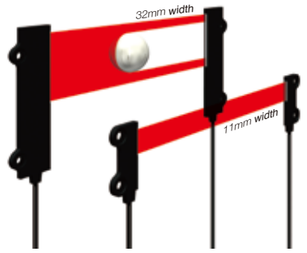


Screen array

It can detect object going through an area utilizing beam screen. It's effective when the position of the object goes through is not stable. We have 11mm width and 32mm width types.

NF-DZ01 is head ON type screen array, 2*15mm,fiber unit that can detect object with holes.

NF-TZ01
NF-TZ02



NF-TZ03
NF-TZ04

Lead frame

Slit is bundles that used for short distance detection and detecting very small object.

The screen array beam goes almost parallelly so its good to prevent cross talk very much.

Beam array

We have also beam array fibers that have core fibers aligned in line.

Thru-beam type

NF-TZ05 Head ON

NF-TZ06 Side ON

Diffuse type

NF-DZ02 Head ON

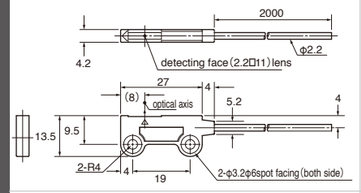
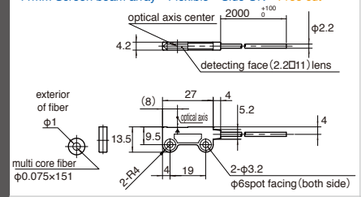
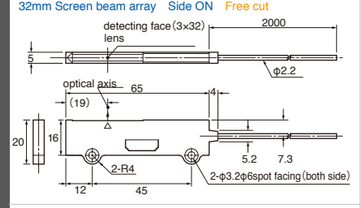
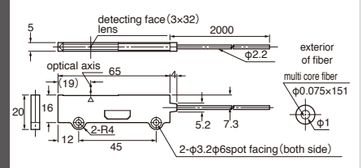
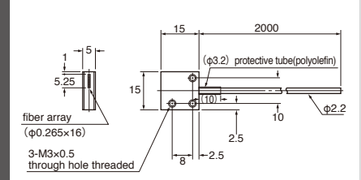
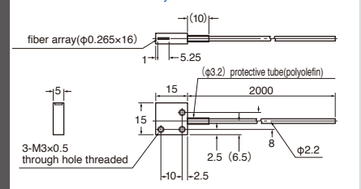
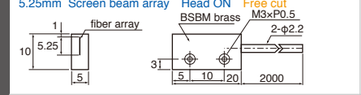
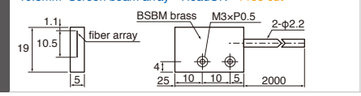
NF-DZ03 Side ON

NF-TS10 Head ON

NF-TS14 Head ON

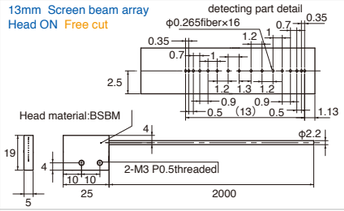
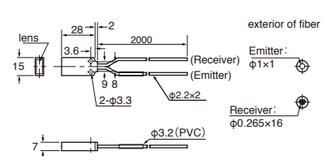
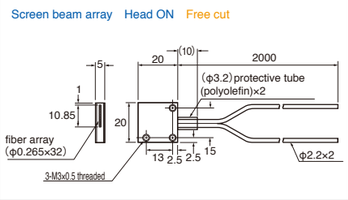
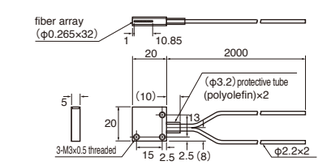
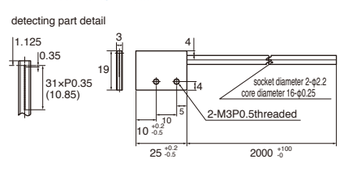
FD-ML02

Specifications (Thru-beam)

	Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	11mm Screen beam array Side ON Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,240 3-ST 2,100 2-FS 2,100 1-HS 900	Long 3,500 Std 3,000 Fast 1,500	2,900	−40～70	R=10	NF-TZ04
	11mm Screen beam array Flexible Side ON Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,240 3-ST 2,100 2-FS 2,100 1-HS 1,400	Long 3,500 Std 3,500 Fast 3,500	1,900	−40～55	R=1	NF-TZ03
	32mm Screen beam array Side ON Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,240 3-ST 2,100 2-FS 2,100 1-HS 1,400	Long 3,500 Std 3,500 Fast 3,500	3,500	−40～60	R=10	NF-TZ02
	32mm Screen beam array Flexible Side ON Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,240 3-ST 2,100 2-FS 2,100 1-HS 1,400	Long 3,500 Std 3,500 Fast 3,500	3,500	−40～55	R=1	NF-TZ01
	5.25mm Screen beam array Head ON Free cut 	7-EL 1,350 6-UL 1,260 5-PL 1,170 4-LG 990 3-ST 660 2-FS 400 1-HS 130	Long 650 Std 400 Fast 250	300	−40～70	R=25	NF-TZ05
	5.25mm Screen beam array Side ON Free cut 	7-EL 1,440 6-UL 1,350 5-PL 1,170 4-LG 1,080 3-ST 710 2-FS 430 1-HS 130	Long 650 Std 400 Fast 250	300	−40～70	R=25	NF-TZ06
	5.25mm Screen beam array Head ON Free cut 	7-EL 4,000 6-UL 1,600 5-PL 1,000 4-LG 900 3-ST 650 2-FS 330 1-HS 100	Long 800 Std 500 Fast 250	330	−40～70	R=25	NF-TS10
	10.5mm Screen beam array HeadON Free cut 	7-EL 4,000 6-UL 1,600 5-PL 1,000 4-LG 900 3-ST 650 2-FS 330 1-HS 100	Long 800 Std 500 Fast 250	330	−40～70	R=25	NF-TS14

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

Specifications (Thru-beam/Diffuse)

	Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	13mm Screen beam array Head ON Free cut 	7-EL 4,000 6-UL 1,500 5-PL 1,400 4-LG 1,200 3-ST 800 2-FS 400 1-HS 100	Long 850 Std 500 Fast 250	350	−40～70	R=25	NF-TS28
Diffuse	Screen beam array Head ON Free cut 	7-EL 620 6-UL 580 5-PL 500 4-LG 440 3-ST 280 2-FS 210 1-HS 59	Long 350 Std 250 Fast 100	N.A.	−40～60	R=25	NF-DZ01
	Screen beam array Head ON Free cut 	7-EL 600 6-UL 560 5-PL 490 4-LG 430 3-ST 270 2-FS 170 1-HS 51	Long 320 Std 170 Fast 85	130	−40～70	R=25	NF-DZ02
	Screen beam array Side ON Free cut 	7-EL 530 6-UL 500 5-PL 440 4-LG 370 3-ST 250 2-FS 140 1-HS 45	Long 320 Std 170 Fast 85	100	−40～70	R=25	NF-DZ03
	Screen beam array Head ON Free cut 	7-EL 950 6-UL 500 5-PL 450 4-LG 400 3-ST 250 2-FS 100 1-HS 40	Long 300 Std 180 Fast 80	35	−40～70	R=25	FD-ML02

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.
Sensing distance of diffuse type is for 500 * 500mm white paper.

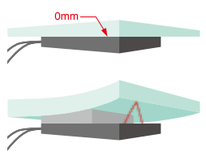
LIMITED DIFFUSE

NF-DC38 / DC39 series

Despite the sensor's thin-flat mechanical design it is excellent in canceling optical influence from background material. Best-in-class Excess Gain is not easily affected by colors of objects.

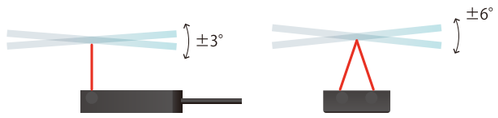
From "0mm" distance (NF-DC39)

NF-DC39 has no dead zone at all.
Clear glass objects are possible to detect in 0-4 mm distance.



Not Affected by change in angle

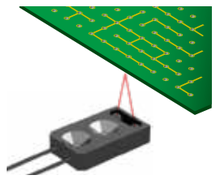
Vibration of glass/silicon object in 3 – 6 degree does not matter.
Fine optical system secures stable sensing.



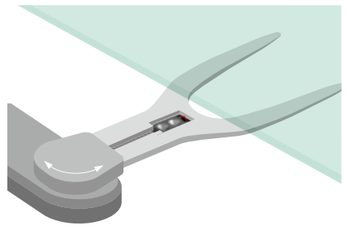
Clearly visible circle spot in red.

4mm wide spot (NF-DC39)

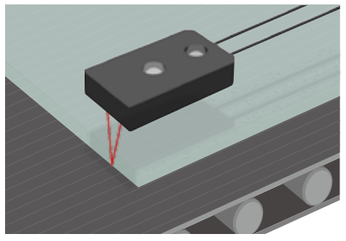
NF-DC39 has 4mm size spot that is applicable to PCB/PWB with holes.



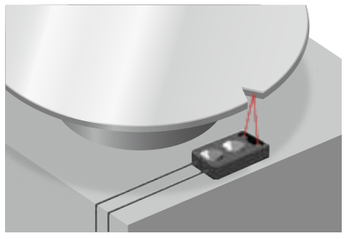
Applications



Edge Detection of Quartz Sheet



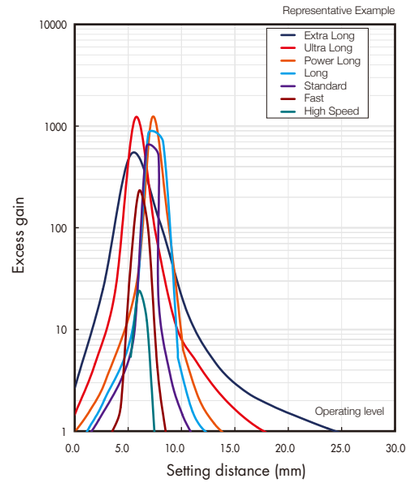
Edge Alignment on conveyor



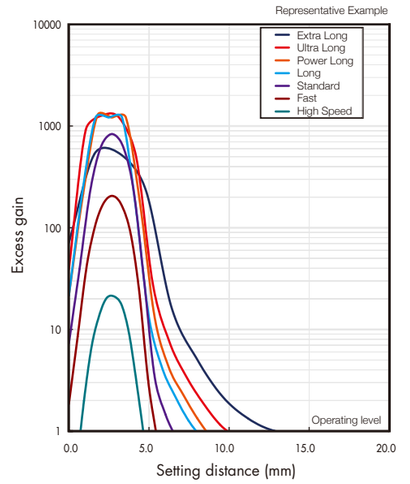
Notch Detection

Excess Gain Curves (Typical Value)

NF-DC38

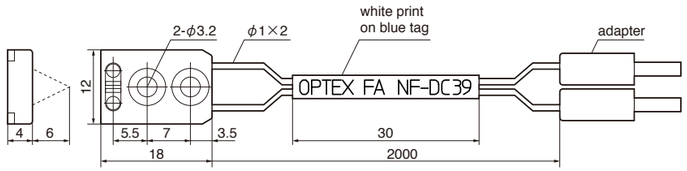


NF-DC39

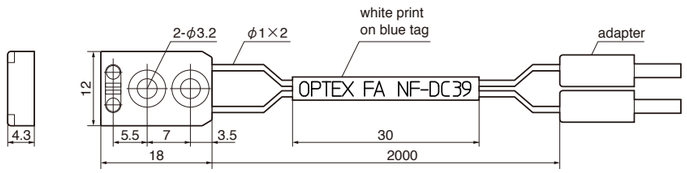


Dimensions (mm)

NF-DC38



NF-DC39



Specifications

Model	NF-DC38	NF-DC39
Sensing Range (D3RF amplifier)	6mm around	0 - 4mm
Spot Size	ϕ1.5mm @ 6mm	ϕ4mm @ 4mm
Bending Radius	R10	
Fiber Lengfth	2000mm Free cut	
Ambient Temp	−40～+60℃	
Storage Temp	−40～+70℃	
Demensions (W □ D □ H)	12 × 18 × 4 mm	12 × 18 × 4.3 mm
Material	Base , Cover : PC Fiber : PMMA	
Torque	3kgfcm max.	
Weight	7g	

Sensing distance

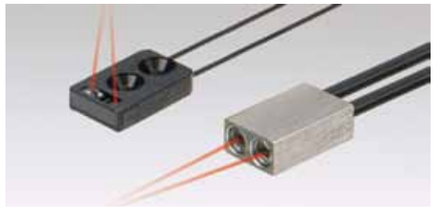
NF-DC38

Value in parenthesis is the Minimum detectable object size. (copper wire)				Operation temperature (℃～℃)	Radius (mm)
Red LED for general purpose		Green LED for Mark Sensing			
D3RF	BRF/BRF-H	D2GF	BGF		
Long mode 450 Standard mode 250 Highspeed mode 100 (0.015)	BRF 160 BRF-H 60 (0.015)	Long mode 160 Standard mode 80 Highspeed mode 40 (0.015)	BGF 45 (0.015)	−40～70	R=30

NF-DC39

Value in parenthesis is the Minimum detectable object size. (copper wire)				Operation temperature (℃～℃)	Radius (mm)
Red LED for general purpose		Green LED for Mark Sensing			
D3RF	BRF/BRF-H	D2GF	BGF		
Long mode 450 Standard mode 250 Highspeed mode 100 (0.015)	BRF 160 BRF-H 60 (0.015)	Long mode 160 Standard mode 80 Highspeed mode 40 (0.015)	BGF 45 (0.015)	−40～70	R=30

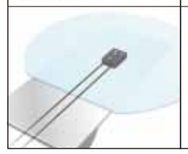
Amplifiers
Various Shape for mounting
Flexible
Various Detecting Scheme
Environment-resistant
Liquid
Extension lens
Notes

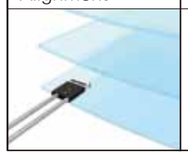


Angled beam enables detection of object at an area.

Detects glass surface

We have 5 types for detecting existence, 5 types for alignment and one for mapping.
You can choose Bend-tolerance type, Heat resistance type and vacuum resistance type.

Existence	NF-DC38	NF-DC39	NF-DC07	NF-DH08	NF-DH06	NF-DN02
	Low cost		Standard	Heat resistant 180°C	Heat resistant 300°C	vacuum resistant･Heat resistant 300°C
						

Alignment	NF-DC05	NF-DC06	NF-DC04	NF-DH10	NF-DH11
	Standard	Flexible	Flexible	Heat resistant 250°C	Heat resistant 300°C
					
	for warp / slant of glass	for warp / slant of glass	longer distance	for warp / slant of glass	for warp / slant of glass

Mapping	NF-DC03
	Standard
	
	glass plate of 0.5mm

For General purpose

NF-DC09 (head ON)

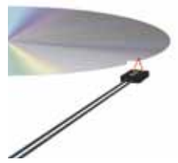
NF-DC08 (flat ON)

NF-DC39 (flat ON)

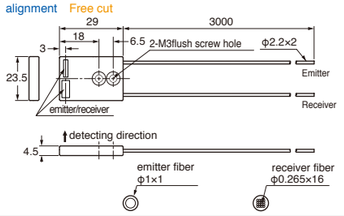
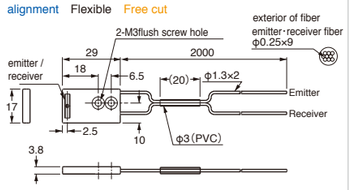
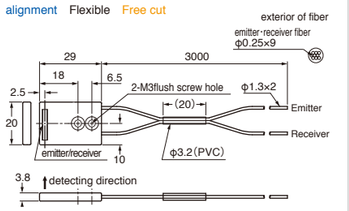
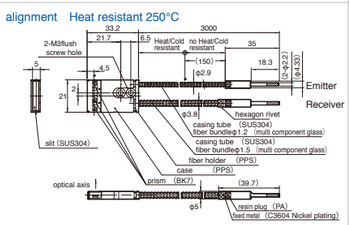
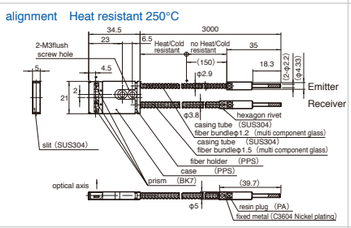
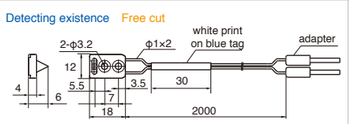
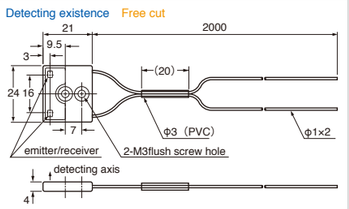
Detecting Cap side

Detecting FOUP

Detecting wafer notch

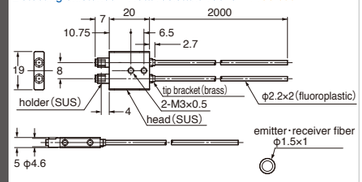
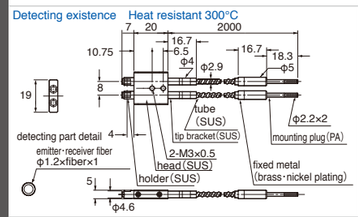
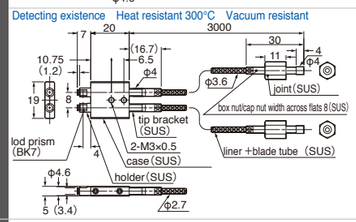
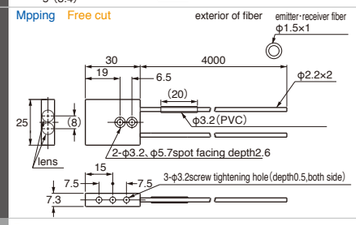
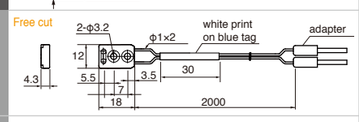
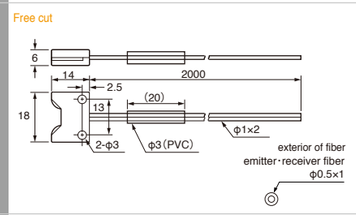
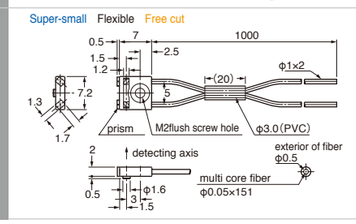


Specifications (Detect Glass)

Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Detect glass / Flat on alignment Free cut 	7-EL 3～44 6-UL 4～39 5-PL 4～38 4-LG 4～37 3-ST 4～35 2-FS 6～29 1-HS 9～18	Long 7～32 Std 10～25 Fast 10～18	15	0～70	R=25	NF-DC05
alignment Flexible Free cut 	7-EL 0～23 6-UL 0～23 5-PL 0～22 4-LG 0～22 3-ST 0～21 2-FS 0～20 1-HS 5～13	Long 0～23 Std 0～17 Fast 0～12	15	0～70	R=4	NF-DC06
alignment Flexible Free cut 	7-EL 0～38 6-UL 0～38 5-PL 0～38 4-LG 0～38 3-ST 0～34 2-FS 0～31 1-HS 4～22	Long 0～36 Std 0～30 Fast 0～15	N.A.	0～70	R=4	NF-DC04
alignment Heat resistant 250°C 	7-EL 2～28 6-UL 2～24 5-PL 2～23 4-LG 3～23 3-ST 3～20 2-FS 3～18 1-HS 4～11	Long 4～20 Std 4～20 Fast 4～15	4～17	−20～250 (normal temperature side: −20～70)	R=25	NF-DH10
alignment Heat resistant 250°C 	7-EL 2～45 6-UL 3～40 5-PL 3～39 4-LG 3～38 3-ST 4～35 2-FS 6～28 1-HS 8～19	Long 6～38 Std 7～30 Fast 8～25	8～25	−20～250 normal temperature side: −20～70)	R=25	NF-DH11
Detecting existence Free cut 	7-EL 0～12 6-UL 0.5～12 5-PL 1.5～10 4-LG 1.5～10	3-ST 2.5～8 2-FS 3.5～7.5 1-HS 4.5～6	Long 2～9 Std 4～8 Fast 5～6	3.5～7	−40～60	R=10	NF-DC38
Detecting existence Free cut 	7-EL 3～16 6-UL 3～14 5-PL 4～14 4-LG 5～14 3-ST 5～13 2-FS 5～11 1-HS 7～8	Long 4～15 Std 5～12 Fast 7～10	7	−40～60	R=10	NF-DC07

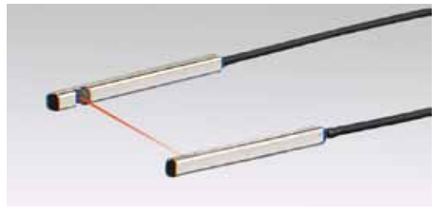
Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

Specifications (Detect Glass/General Purpose)

Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Detect glass / Flat ON Detecting existence Heat resistant 180°C Free cut 	7-EL 0～35 6-UL 0～28 5-PL 0～25 4-LG 0～22 3-ST 0～20 2-FS 0～9 1-HS 3～4	Long 0～20 Std 0～10 Fast 0～8	10	−60～180	R=25	NF-DH08
Detecting existence Heat resistant 300°C 	7-EL 0～40 6-UL 0～34 5-PL 0～22 4-LG 0～18 3-ST 0～17 2-FS 0～9 1-HS 0～4	Long 0～15 Std 0～10 Fast 0～8	6	−30～300 または −60～200	R=25	NF-DH06
Detecting existence Heat resistant 300°C Vacuum resistant 	7-EL 0～22 6-UL 0～12 5-PL 0～11 4-LG 0～9 3-ST 0～7 2-FS 3～4 1-HS N.A.	Long 0～8 Std 2.5～5 Fast N.A.	3	−30～300	R=18	NF-DN02
Head ON Mpping Free cut 	7-EL 2～310 6-UL 3～160 5-PL 4～130 4-LG 5～120 3-ST 5～110 2-FS 10～95 1-HS 12～60	Long 10～55 Std 10～45 Fast 13～35	55	−40～60	R=25	NF-DC03
Flat ON Free cut 	7-EL 1.5～4 6-UL 0～4 5-PL 0～4 4-LG 0～4 3-ST 0～4 2-FS 0～4 1-HS 0～4	Long 0～4 Std 0～4 Fast 0～4	0～4	−40～60	R=10	NF-DC39
General purpose / Head ON Free cut 	7-EL 0～15 6-UL 5～12 5-PL 5～11 4-LG 6～11 3-ST 6～10 2-FS 7～9 1-HS 6～7	Long 4.5～11 Std 4.5～10 Fast 4.5～10	6	−40～70	R=10	NF-DC09
Flat ON Super-small Flexible Free cut 	7-EL 0～9 6-UL 0～8 5-PL 0～7 4-LG 0～6 3-ST 0～5 2-FS 0～3 1-HS 0～2	Long 1～7 Std 1～5.5 Fast 1～3	3	−20～60	R=1	NF-DC08

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.
Sensing distance of diffuse type is for 500 * 500mm white paper.

NARROW BEAM , WAFER MAPPING

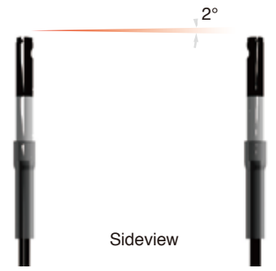


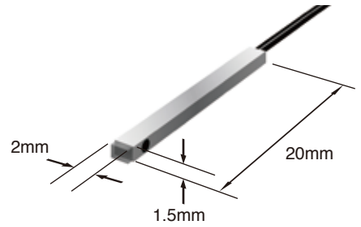
Installed lens narrows light angle that detects.
This reduces cross talk.

Super narrow beam and super thin type

Super narrow view type: Aperture is 2°max.
Ideal for wafer mapping.
Straight type: NF-TG01
Side type: NF-TG02,03

NF-DZ01 is head ON type screen array, 2*15mm,fiber unit that can detect object with holes.

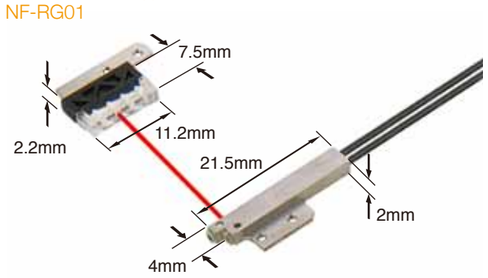




Retro-reflective and diffuse type

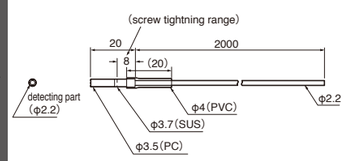
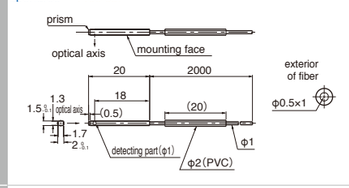
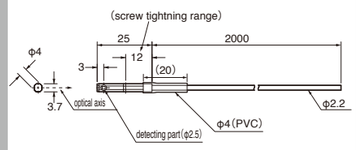
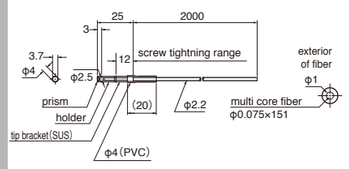
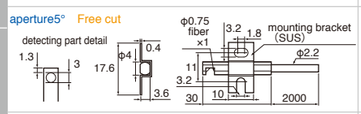
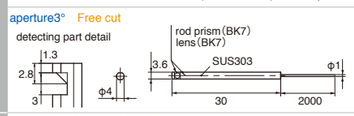
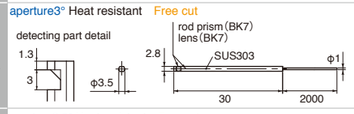
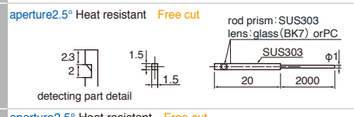
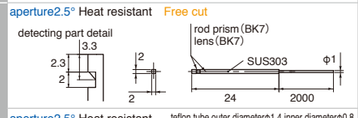
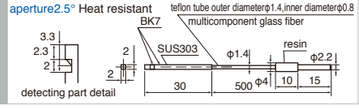
Super thin 2mm height Retro-reflective type enables wafer mapping saving space.

Retro-reflective type
NF-RG01



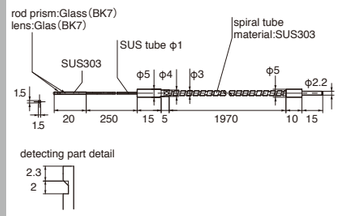
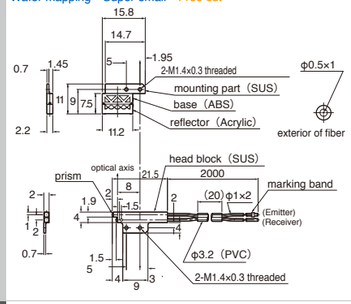
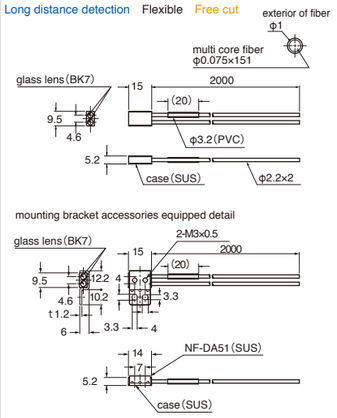
Diffuse type
NF-DR09

Specifications (Thru-beam/Thru-beam Side)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	φ3.7	aperture2° Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,200 3-ST 2,100 2-FS 2,000 1-HS 790	Long 3,000 Std 2,000 Fast 1,300	2,300	−40～70	R=25	NF-TG01
Thru-beam side	2×1.5	aperture3° Free cut 	7-EL 1,000 6-UL 900 5-PL 790 4-LG 690 3-ST 450 2-FS 260 1-HS 90	Long 500 Std 300 Fast 150	220	−40～55	R=10	NF-TG04
		aperture2° Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,300 3-ST 2,100 2-FS 1,780 1-HS 510	Long 2,500 Std 1,600 Fast 800	900	−40～60	R=25	NF-TG03
	φ4	aperture2° Flexible Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,300 3-ST 2,100 2-FS 1,500 1-HS 520	Long 2,500 Std 1,600 Fast 800	1,000	−40～55	R=1	NF-TG02
		aperture5° Free cut 	7-EL 4,000 6-UL 4,000 5-PL 4,000 4-LG 3,000 / 3-ST 2,800 2-FS 2,000 1-HS 1,000	Long 4,000 Std 3,000 Fast 2,000	1,700	−40～70	R=25	NF-TS12
		aperture3° Free cut 	7-EL 4,000 6-UL 4,000 5-PL 4,000 4-LG 3,000 / 3-ST 2,000 2-FS 1,000 1-HS 300	Long 3,000 Std 1,600 Fast 700	750	−40～70	R=25	NF-TS22
	φ3.5	aperture3° Heat resistant Free cut 	7-EL 3,500 6-UL 2,500 5-PL 2,300 4-LG 1,900	3-ST 1,300 2-FS 650 1-HS 200	Long 1,200 Std 700 Fast 500	500	−40～70	R=10	NF-TS22H
	□1.5	aperture2.5° Heat resistant Free cut 	7-EL 2,300 6-UL 1,200 5-PL 1,100 4-LG 950	3-ST 600 2-FS 300 1-HS 100	Long 600 Std 300 Fast 100	200	−40～70	R=10	NF-TS25
	□2	aperture2.5° Heat resistant Free cut 	7-EL 3,500 6-UL 2,400 5-PL 2,200 4-LG 1,900	3-ST 1,200 2-FS 600 1-HS 150	Long 900 Std 600 Fast 400	400	−40～70	R=10	NF-TS23
		aperture2.5° Heat resistant 	7-EL 2,000 6-UL 1,000 5-PL 950 4-LG 800	3-ST 550 2-FS 250 1-HS 80	Long 500 Std 300 Fast 100	150	−40～70	R=30	NF-TS27

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

Specifications (Thru-beam Side/Retro Reflective/Diffuse)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam side	φ5	aperture3° Heat resistant 	7-EL 1,000 6-UL 570 5-PL 520 4-LG 450 3-ST 300 2-FS 150 1-HS 45	Long 500 Std 300 Fast 100	150	−40～70	fiber R=25 tube R=10	NF-TS24
Retro reflective	4×2	Wafer mapping Super-small Free cut 	7-EL 590 6-UL 550 5-PL 480 4-LG 420 3-ST 270 2-FS 180 1-HS 70	Long 350 Std 230 Fast 130	N.A.	−40～60	R=10	NF-RG01
Diffuse	square	Long distance detection Flexible Free cut 	7-EL 1,070 6-UL 990 5-PL 880 4-LG 770 3-ST 500 2-FS 310 1-HS 90	Long 600 Std 380 Fast 200	250	−40～70	R=1	NF-DR09

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.
Sensing distance of diffuse type is for 500 * 500mm white paper.

HEAT RESISTANT(up to130°)

You can find what you want in various line up from 34 specs.

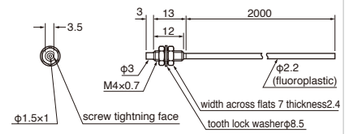
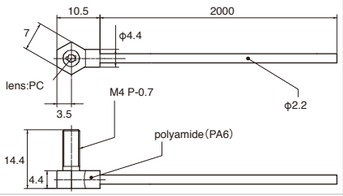
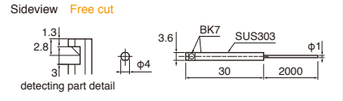
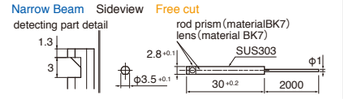
Space saving

Heat resistant right angle type NF25-TH and NF25-DH help installing in limited space.

Straight type

Right angle type

Specifications (Thru-beam)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	130℃	Free cut 	7-EL 2,100 6-UL 2,070 5-PL 1,800 4-LG 1,530 3-ST 990 2-FS 620 1-HS 200	Long 1,100 Std 650 Fast 400	500	−60～130	R=25	NF-TH17
	105℃	Nut Free cut 	7-EL 2,000 6-UL 1,100 5-PL 1,000 4-LG 900 3-ST 600 2-FS 300 1-HS 90	Long 750 Std 500 Fast 170	300	−40～105	R=25	NF25-TH
		Sideview Free cut 	7-EL 3,500 6-UL 2,300 5-PL 2,000 4-LG 1,800 / 3-ST 1,200 2-FS 600 1-HS 170	Long 1,300 Std 700 Fast 400	500	−40～105	R=10	NF-TS22M
		Narrow Beam Sideview Free cut 	7-EL 3,500 6-UL 2,500 5-PL 2,300 4-LG 1,900 / 3-ST 1,300 2-FS 650 1-HS 200	Long 1,200 Std 700 Fast 500	500	−40～105	R=10	NF-TS22H

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH

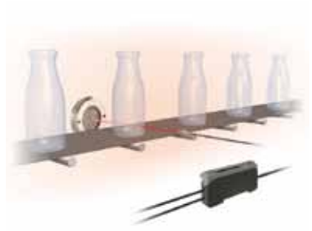
Specifications (Thru-beam/Diffuse)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	105℃	Narrow Beam Sideview Free cut rod prism:SUS303 lens:glass(BK7) orPC detecting part detail	7-EL 2,300 6-UL 1,200 5-PL 1,100 4-LG 950 / 3-ST 600 2-FS 300 1-HS 100	Long 600 Std 300 Fast 100	200	−40～105	R=10	NF-TS25
		Narrow Beam Sideview Free cut detecting part detail rod prism(BK7) lens(BK7)	7-EL 3,500 6-UL 2,400 5-PL 2,200 4-LG 1,900 / 3-ST 1,200 2-FS 600 1-HS 150	Long 900 Std 600 Fast 400	400	−40～105	R=10	NF-TS23
		φ1 Sleeve:25mm&10mm 45°oblique light axis Heat resistant Free cut Fixing cut 45° light angle SUS304 SUS303 PC	7-EL 100 6-UL 55 5-PL 50 4-LG 40 3-ST 30 2-FS 10 1-HS 4	Long 28 Std 20 Fast 15	16	−40～105	R=10	NF-TH06
	100℃	lense attachable (P.82) Free cut φ1fiber×1 M2.6×P0.45 M4×P0.7 φ2.2	7-EL 2,400 6-UL 1,400 5-PL 1,000 4-LG 900 / 3-ST 700 2-FS 300 1-HS 100	Long 700 Std 400 Fast 200	300	−40～100	R=25	NF-TH01
	130℃	Free cut φ1.5×2 detecting part detail screw tightning face M6×0.75 φ5 φ2.2×2 (fluoroplastic) width across flats10 thickness2 tooth lock washerφ11	7-EL 720 6-UL 670 5-PL 580 4-LG 510 3-ST 330 2-FS 200 1-HS 63	Long 350 Std 200 Fast 120	200	−60～130	R=25	NF-DH09
Diffuse	105℃	Free cut lens:PC M6 P=1.0 polyamide(PA6) 2—φ2.2	7-EL 650 6-UL 350 5-PL 280 4-LG 240 3-ST 175 2-FS 100 1-HS 25	Long 120 Std 80 Fast 25	15	−40～105	R=25	NF25-DH
		Free cut φ1.0×2 2- C0.5 M6×P0.75 2- φ2.2	7-EL 950 6-UL 500 5-PL 450 4-LG 400 / 3-ST 250 2-FS 130 1-HS 40	Long 300 Std 180 Fast 80	160	−40～105	R=25	FD-3SD1(100)
	100℃	Free cut φ1×2 detecting part detail φ2.5 SUS M6×P0.75 SUS φ2.2	7-EL 850 6-UL 550 5-PL 450 4-LG 375 / 3-ST 275 2-FS 170 1-HS 55	Long 250 Std 150 Fast 50	110	−40～100	R=25	NF-DH02

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.
Sensing distance of diffuse type is for 500 * 500mm white paper.

Heat resistant reflector SW50

SW50 can be used with heat resistant Retro-reflective fiber unit in high temperature atmosphere.



HEAT RESISTANT(up to 200°)

You can find what you want in the variety of 34 products .

Various selection

We have 14 types of heat resistant, 180~200 deg.C, fiber units.

Thru-beam(Standard)

Head view			Sideview		
NF-TH10	NF-TH11	NF-TH02	NF-TH04S-27V2	NF-TH05S-A	NF-TS27
Heat resistant 200°C	Heat resistant 200°C	Heat resistant 180°C	Heat resistant 200°C	Heat resistant 200°C	Heat resistant 200°C
					
Lens atacchable	Lens atacchable	Free cut	φ1 Sleeve	φ1.5 Sleeve	Aperture2.5°

Thru-beam(Joint type)

Head view			Sideview	
NF-TH12	NF-TH13	NF-TH14	NF-TH15	NF-TH16
Heat resistant 200°C	Heat resistant 200°C	Heat resistant 200°C	Heat resistant 200°C	Heat resistant 200°C
				
Free cut	Free cut	Free cut	Free cut	Free cut

*Freecut only at ordinary temp. part

Diffuse

Coaxial	Standard
NF-DH07	NF-DH01
Heat resistant 200°C	Heat resistant 180°C
	
Metal coated	Free cut

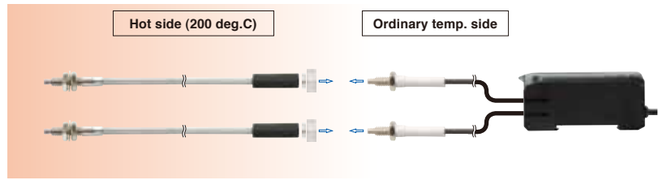
Limited Diffuse

Detect glass
NF-DH08
Heat resistant 180°C

Free cut

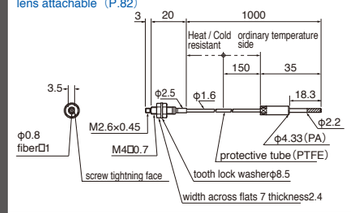
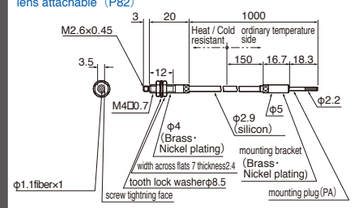
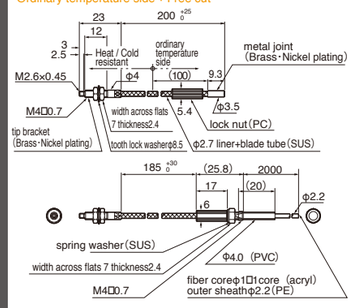
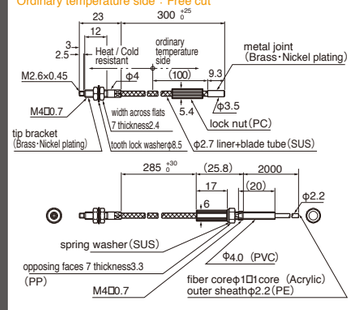
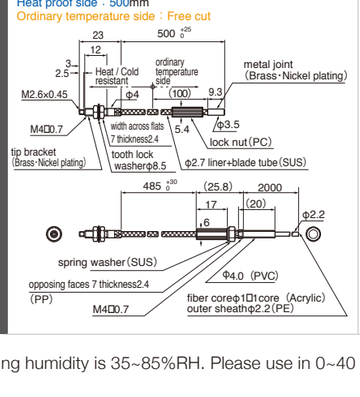
New concept : Joint type

A regular finer and a heat resistant fiber unit are connectable each other. It's possible to adjust total length by cutting standard fiber.



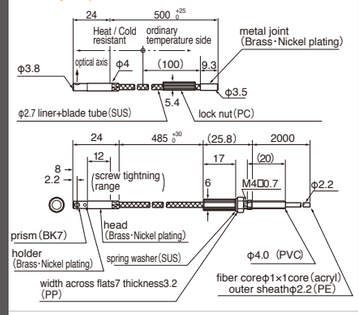
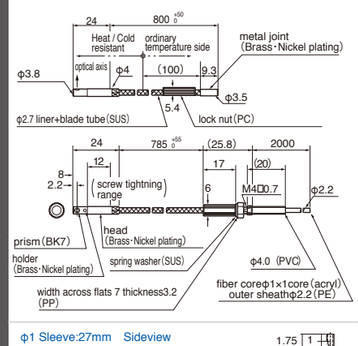
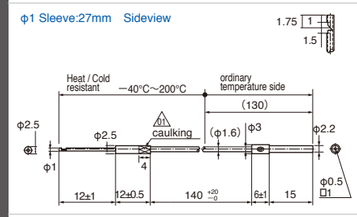
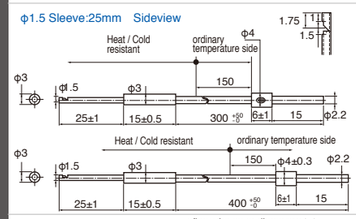
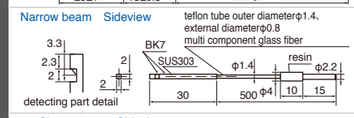
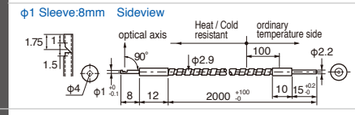
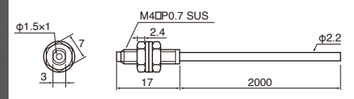
We supply them separately if you need them for maintenance purpose.

Specifications (Thru-beam)

	Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam 200℃	lens attachable (P.82) 	7-EL 570 6-UL 540 5-PL 460 4-LG 410 3-ST 270 2-FS 160 1-HS 45	Long 350 Std 180 Fast 85	110	−60～200	R=10	NF-TH10
	lens attachable (P82) 	7-EL 1,350 6-UL 1,260 5-PL 1,130 4-LG 990 3-ST 630 2-FS 360 1-HS 110	Long 750 Std 450 Fast 220	280	−60～200	R=25	NF-TH11
	lens attachable (P.82) Heat proof side：200mm Ordinary temperature side：Free cut 	7-EL 1,080 6-UL 990 5-PL 900 4-LG 790 3-ST 510 2-FS 290 1-HS 90	Long 550 Std 350 Fast 170	220	−60～200	Heat proof part R=18 ordinary temperature part R=25	NF-TH12
	Heat proof side：300mm Ordinary temperature side：Free cut 	7-EL 1,080 6-UL 990 5-PL 900 4-LG 790 3-ST 510 2-FS 290 1-HS 90	Long 550 Std 350 Fast 170	220	−60～200	Heat proof part R=18 ordinary temperature part R=25	NF-TH13
	Heat proof side：500mm Ordinary temperature side：Free cut 	7-EL 1,080 6-UL 990 5-PL 900 4-LG 790 3-ST 510 2-FS 290 1-HS 90	Long 550 Std 350 Fast 170	220	−60～200	Heat proof part R=18 ordinary temperature part R=25	NF-TH14

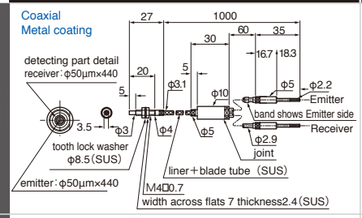
Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

Specifications (Thru-beam)

	Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam 200℃	Sideview Heat proof side：500mm Ordinary temperature side：Free cut 	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	−60～200	Heat proof part R=18 ordinary temperature part R=25	NF-TH15
	Sideview Heat proof side：800mm Ordinary temperature side：Free cut 	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	−60～200	Heat proof part R=18 ordinary temperature part R=25	NF-TH16
	φ1 Sleeve:27mm Sideview 	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	−60～200	R=30	NF-TH04S-27V2
	φ1.5 Sleeve:25mm Sideview 	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	−60～200	R=30	NF-TH05S-A
	Narrow beam Sideview 	7-EL 2,000 6-UL 1,000 5-PL 950 4-LG 800 3-ST 550 2-FS 250 1-HS 80	Long 500 Std 300 Fast 100	150	−60～200	R=30	NF-TS27
	φ1 Sleeve:8mm Sideview 	7-EL 300 6-UL 160 5-PL 150 4-LG 100 3-ST 90 2-FS 40 1-HS 14	Long 125 Std 60 Fast 30	50	−60～200	R=50	NF-TH07
180℃	Free cut 	7-EL 4,000 6-UL 2,200 5-PL 1,700 4-LG 1,500 3-ST 1,000 2-FS 550 1-HS 180	Long 1,000 Std 700 Fast 350	600	−60～200	R=35	NF-TH02

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

Specifications (Diffuse/Limited Diffuse)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Diffuse	200℃	Coaxial Metal coating 	7-EL 100 6-UL 55 5-PL 50 4-LG 40 3-ST 30 2-FS 10 1-HS 4	Long 28 Std 20 Fast 15	16	−60～200	R=25	NF-DH07
	180℃	Free cut	7-EL 2,400 6-UL 1,400 5-PL 1,000 4-LG 900 / 3-ST 700 2-FS 300 1-HS 100	Long 700 Std 400 Fast 200	300	−60～200	R=35	NF-DH01
Limited diffuse	180℃	Detect glass Free cut	7-EL 720 6-UL 670 5-PL 580 4-LG 510 3-ST 330 2-FS 200 1-HS 63	Long 350 Std 200 Fast 120	200	−60～200	R=25	NF-DH08

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.
Sensing distance of diffuse type is for 500 * 500mm white paper.

HEAT RESISTANT(200°~300°)

You can find what you want in various line up from 34 specs.

Thru-beam, Diffuse, Limited diffuse type

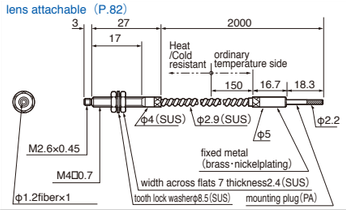
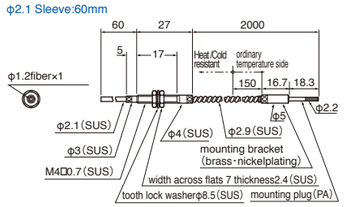
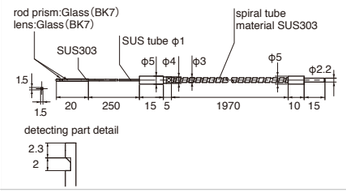
We have 3 thru-beam types, 3 diffuse types and 3 limited diffuse type.

Thru-beam

Diffuse

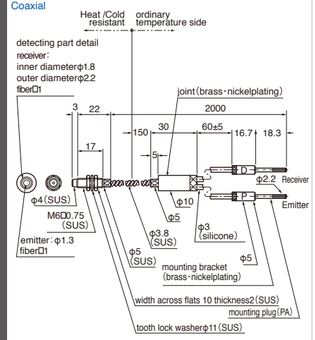
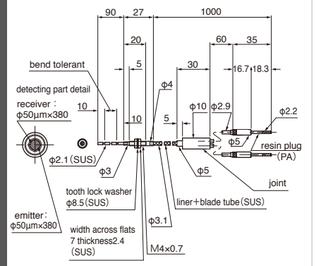
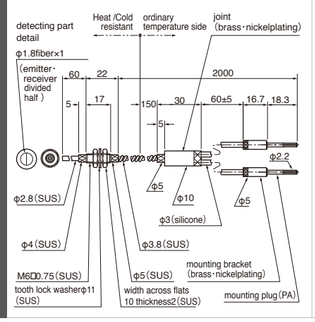
Limited diffuse

Specifications (Thru-beam)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	350℃	lens attachable (P.82) 	7-EL 1,440 6-UL 1,350 5-PL 1,240 4-LG 1,080 3-ST 710 2-FS 430 1-HS 130	Long 750 Std 450 Fast 220	300	−30～350 or −60～200	R=25	NF-TH08
		φ2.1 Sleeve:60mm 	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	−30～350 or −60～200	Fiber R=25 Sleeve R=10	NF-TH09
	300℃	Narrow Beam Sideview 	7-EL 1,000 6-UL 570 5-PL 520 4-LG 450 3-ST 300 2-FS 150 1-HS 45	Long 500 Std 300 Fast 100	150	−40～300	Fiber R=25 Tube R=10	NF-TS24

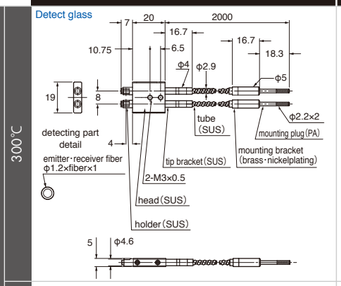
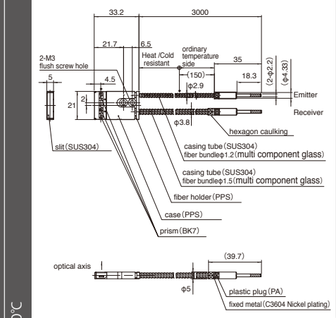
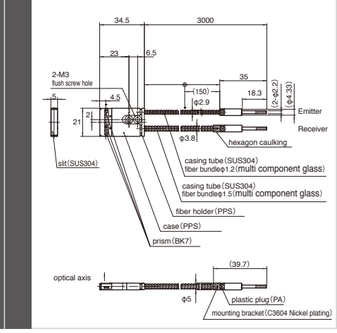
Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

Specifications (Diffuse)

	Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Diffuse 350℃	Coaxial 	7-EL 940 6-UL 890 5-PL 770 4-LG 670 3-ST 440 2-FS 190 1-HS 50	Long 650 Std 250 Fast 80	150	—30～350 or —60～200	R=25	NF-DH03
	φ2.1 Sleeve:90mm 	7-EL 1,110 6-UL 1,050 5-PL 910 4-LG 800 3-ST 520 2-FS 190 1-HS 50	Long 750 Std 250 Fast 80	200	—30～350 or —60～200	Fiber R=25 Sleeve R=10	NF-DH05
	φ2.8 Sleeve:60mm 	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	—30～350 or —60～200	Fiber R=25 Sleeve R=10	NF-DH04

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.
Sensing distance of diffuse type is for 500 * 500mm white paper.

Specifications (Limited Diffuse)

	Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Limited diffuse 300℃	Detect glass 	7-EL 0～40 6-UL 0～34 5-PL 0～22 4-LG 0～18 3-ST 0～17 2-FS 0～9 1-HS 0～4	Long 0～15 Std 0～10 Fast 0～8	6	—30～300 or —60～200	R=25	NF-DH06
Limited diffuse 250℃	Glass plate alignment Flat ON 	7-EL 2～28 6-UL 2～24 5-PL 2～23 4-LG 3～23 3-ST 3～20 2-FS 3～18 1-HS 4～11	Long 4～20 Std 4～20 Fast 4～15	4～17	—20～250 (ordinary temp. —20～70)	R=25	NF-DH10
	Glass plate alignment Flat ON 	7-EL 2～45 6-UL 3～40 5-PL 3～39 4-LG 3～38 3-ST 4～35 2-FS 6～28 1-HS 8～19	Long 6～38 Std 7～30 Fast 8～25	8～25	—20～250 (ordinary temp. —20～70)	R=25	NF-DH11

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

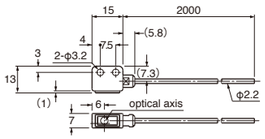
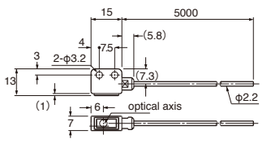
CHEMICAL RESISTANT

Fluoro-plastic sheath enables chemical resistant.

Resistant to various chemical stuffs

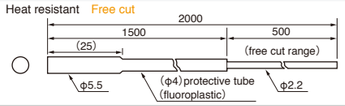
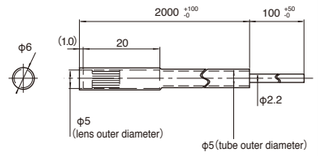
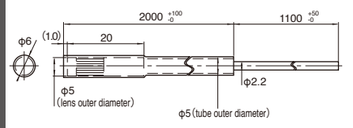
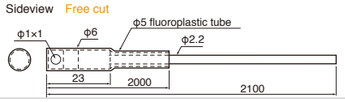
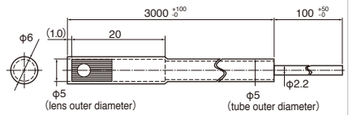
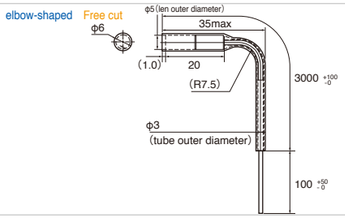
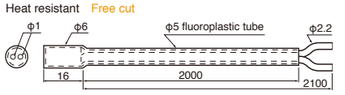
Fluoro-plastic sheath covers sensor head and fiber and protects from chemicals.
We have 8 thru-beam types and one diffuse type.

Specifications (Thru-beam)

	Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam Square	Side ON Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,150 3-ST 2,000 2-FS 2,000 1-HS 750	Long 3,500 Std 2,500 Fast 1,300	2,000	0～60	R=25	NF-TY05
	Side ON length of fiber：5m Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,600 4-LG 3,200 3-ST 2,000 2-FS 1,600 1-HS 550	Long 3,000 Std 2,000 Fast 1,000	1,500	0～60	R=25	NF-TY05-5

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH

Specifications (Limited Diffuse)

		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	φ5.5	Heat resistant Free cut 	7-EL 3,600 6-UL 3,600 5-PL 3,300 4-LG 2,880 3-ST 1,890 2-FS 1,890 1-HS 660	Long 3,500 Std 2,300 Fast 1,200	2,000	−40～115	R=30	NF-TY04
	φ6	Heat resistant Free cut 	7-EL 4,000 6-UL 4,000 5-PL 4,000 4-LG 3,000 3-ST 2,800 2-FS 2,000 1-HS 700	Long 3,500 Std 2,500 Fast 1,200	2,000	−40～105	R=60	NF-TY01
		Heat resistant length of fiber：3m Free cut 	7-EL 4,000 6-UL 4,000 5-PL 4,000 4-LG 3,500 3-ST 3,000 2-FS 1,700 1-HS 500	Long 2,200 Std 1,300 Fast 550	650	−40～105	R=60	NF-TY01-3
	φ6	Sideview Free cut 	7-EL 4,000 6-UL 3,500 5-PL 2,800 4-LG 2,000 3-ST 1,500 2-FS 700 1-HS 200	Long 1,500 Std 800 Fast 400	500	−40～70	R=60	NF-TY02
		Sideview Free cut 	7-EL 4,000 6-UL 3,500 5-PL 3,000 4-LG 2,000 3-ST 1,500 2-FS 700 1-HS 200	Long 1,500 Std 800 Fast 400	480	−40～70	Fiber R=25 Tube R=60	NF-TY02-TF3
		elbow-shaped Free cut 	7-EL 4,000 6-UL 4,000 5-PL 3,500 4-LG 3,000 3-ST 2,200 2-FS 1,000 1-HS 300	Long 3,000 Std 1,700 Fast 800	900	−55～70	Fiber R=20 Tube R=20	NF-TY03-TF3
Diffuse	φ6	Heat resistant Free cut 	7-EL 440 6-UL 280 5-PL 250 4-LG 225 3-ST 160 2-FS 745 1-HS 85	Long 100 Std 70 Fast 50	45	−40～100	R=60	NF-DY01

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

VACUUM RESISTANT

Vacuum resistant and heat (300 deg.C) resistant fiber units.

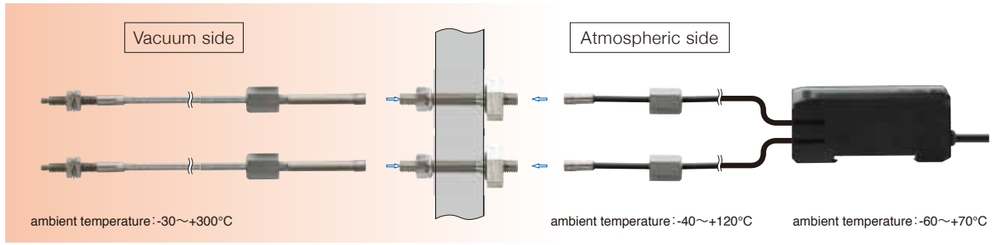
Thru-beam, Diffuse, Limited diffuse type

You can choose from three types of Vacuum resistant fibers.
Separate lens are for long distant detection and side view detection.

Thru-beam
NF-TN01

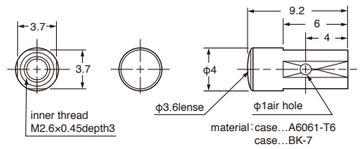
Diffuse
NF-DN01

Limited diffuse
NF-DN02



Lens for vacuum resistant fiber unit

Lens for long distant detection
NF-TA06

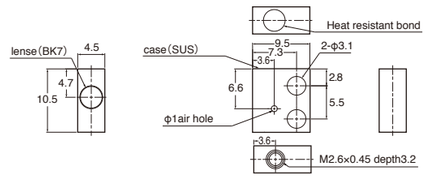


Sensing distance (unit=mm)

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

ambient temperature：-30～+300°C

Lens for side view detection
NF-TA07 (only for NF-TN01)

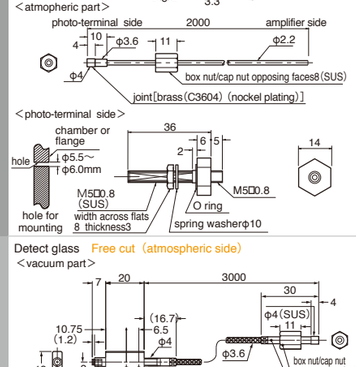
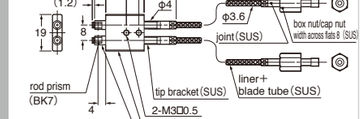
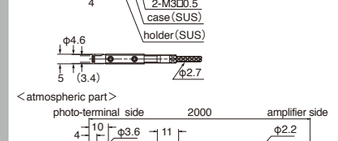
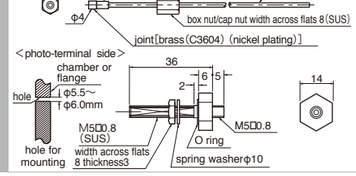


Sensing distance (unit=mm)

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

ambient temperature：-30～+300°C

Specifications (Thru-beam/Diffuse/Limited Diffuse)

	Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	lens attachable Free cut (atmospheric side) ＜vacuum part＞  ＜atmospheric part＞  ＜photo-terminal side＞ 	7-EL 790 6-UL 740 5-PL 640 4-LG 560 3-ST 360 2-FS 210 1-HS 70	Long 450 Std 280 Fast 130	150	−30～300	R=18	NF-TN01
Diffuse	Free cut (atmospheric side) ＜vacuum part＞  ＜atmospheric part＞ ＜photo-terminal side＞ 	7-EL 470 6-UL 450 5-PL 390 4-LG 340 3-ST 220 2-FS 135 1-HS 41	Long 5～250 Std 5～200 Fast 10～70	100	−30～300	R=18	NF-DN01
Limited Diffuse	Detect glass Free cut (atmospheric side) ＜vacuum part＞ ＜atmospheric part＞ ＜photo-terminal side＞ 	7-EL 0～22 6-UL 0～12 5-PL 0～11 4-LG 0～9 3-ST 0～7 2-FS 3～4 1-HS N.A.	Long 0～8 Std 2.5～5 Fast N.A.	3	−30～300	R=18	NF-DN02

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.
Sensing distance of diffuse type is for 500 * 500mm white paper.

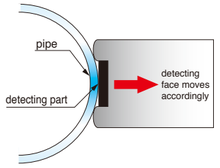
WATER, WATER LEVEL

Various line up for detecting liquid. You can choose depends on application.

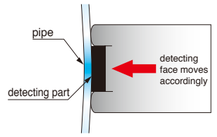
Liquid level: pipe mount type

You can mount on the pipe, 8~80mm Dia.
NF-DF07 has 18 fiber cores for 8.75mm width to detect liquid level stably.

8mm Dia.



80mm Dia.



Liquid level: contact type

It prevents accumulation of liquid at tip of the sensor head by small protrusion at the tip.

3 types of joint are available;

NF-DA54 for Preventing liquid Intrusion

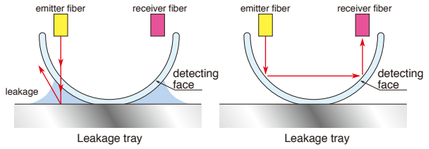
NF-DA55 for Extending fiber unit

NF-DA56 for mounting

You can procure ferrule for joint above; NF-DA57

Leakage type

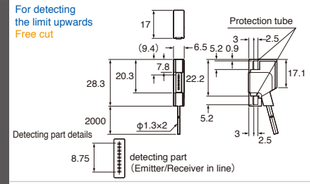
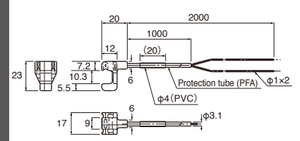
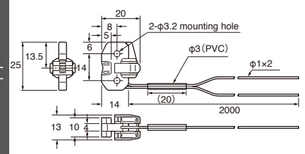
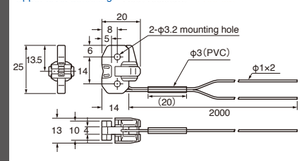
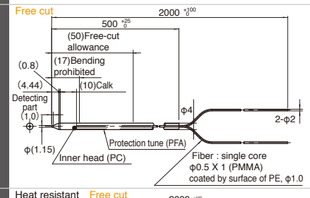
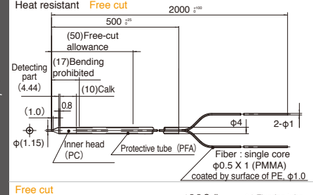
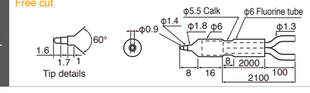
It detects liquid leakage on the surface of flat pan.



When liquid leaked, the light defuses at the leakage and doesn't get to receiver.

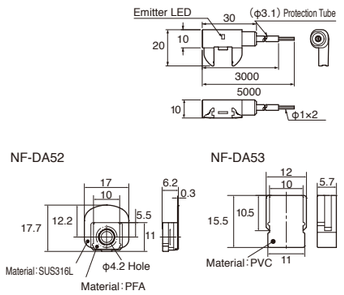
The light reflects at the detecting face and the light comes into receiver.

Specifications (Liquid Level)

	Sensing head	Sensing conditions	Operation temperature (℃～℃)	Radius (mm)	Part Number
Liquid level / pipe	For detecting the limit upwards Free cut 	Array type, best for liquid with bubbles. For transparent pipe of the outer diameter bigger than 8mm.	−40～70	R=10	NF-DF07
	For detecting the limit downwards Free cut 	For PFA / transparent pipe of the outer diameter between 3 and 10 mm with width of 0.3 – 1.0mm.	−20～60	protective tube R=20 Bending radius R=4	NF-TF01
	Upper level detecting Heat resistant Free cut 	Position adjuster gives freedom of installation. For PFA / transparent pipe of the outer diameter between 6 and 26 mm with width of 1.0mm.	−40～100	R=10	NF-DF05
	Upper level detecting Heat resistant Free cut 	Position adjuster gives freedom of installation. For PFA / transparent pipe of the outer diameter between 6 and 26 mm with width between of 1.0 and 3.0 mm.	−40～100	R=10	NF-DE04
φ4	Free cut 	Contact type with protection tube of 500mm length (free-cut). Mechanically protect the fiber from liquid ball that accumulates at the tip.	−40～70	protective tube R=20 fiber R=10	NF-DF06
φ4	Heat resistant Free cut 	Contact type of heat resistant material up to 105 Celsius Mechanically protect the fiber from liquid ball that accumulates at the tip. Protection tube : Fluorine 500mm, free-cut	−40～105	protective tube R=20 fiber R=10	NF-DF08
φ6	Free cut 	Contact type with protection tube of 2,000mm length (free-cut). Mechanically protect the fiber from liquid ball that accumulates at the tip.	−40～70	R=60	NF-DF03

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

Specifications (Leakage Detect)

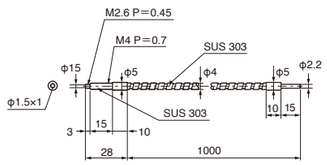
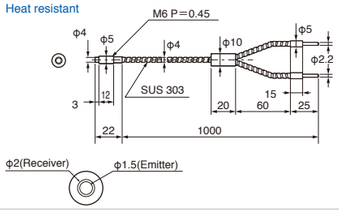
	Sensing head	Sensing conditions	Operation temperature (℃～℃)	Radius (mm)	Part Number
Leakage detect / Square	Free cut 	Corresponds to SEMI S2 Requires fixture for installation; NF-DA52 (SUS) NF-DA53 (PVC)	−20～50	protective tube R=20 fiber R=4	NF-DW02

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH.

Detects water

Water-mixed liquid in a transparent bottle is detectable under combined use with Infrared-type amplifiers.

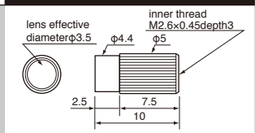
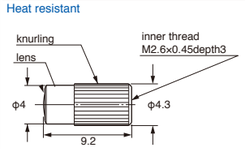
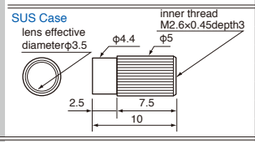
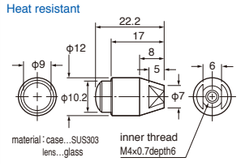
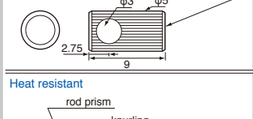
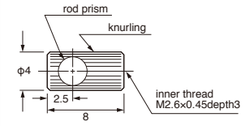
Specifications (Thru-beam/Diffuse)

		Sensing head	Sensing distance (unit-mm) by Infrared-type Amplifiers: D3IF series (by operating mode)	Sensing distance (unit-mm) by Infrared-type Amplifiers: BIF series	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	M4	Heat resistant 	7-EL 650 6-UL 350 5-PL 300 4-LG 250 3-ST 230 2-FS 150 1-HS 60	100	−40～200	R=25	NF-TW01
Diffuse	M6	Heat resistant 	7-EL 280 6-UL 125 5-PL 110 4-LG 100 3-ST 85 2-FS 45 1-HS 20	30	−40～200	R=25	NF-DW01

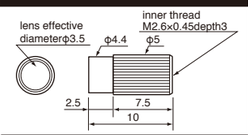
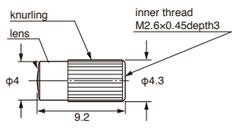
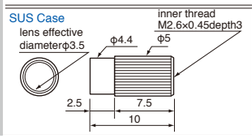
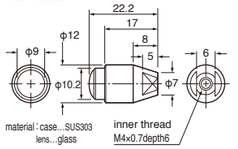
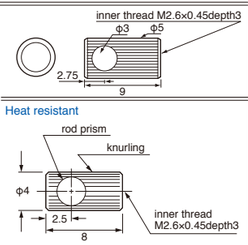
Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH
Sensing distance of diffuse type is for 500 * 500mm white paper.

LENS FOR THRU-BEAM FIBERS

Various lenses e.g. lens that lengthen sensing distance, right angle side beam lenses.

	Dimentions (mm)	Applicable fiber cable	D3RF Sensing distance(mm) 7-EL	6-UL	5-PL	4-LG	3-ST	2-FS	1HS	Operation temperature	Part number
Long distance		NF-TB01	4,000	4,000	4,000	4,000	4,000	2,500	800	−40～100°C	NF-TA01
		NF-TB02	4,000	4,000	4,000	4,000	4,000	4,000	1,800		
		NF-TB06	4,000	4,000	4,000	4,000	4,000	4,000	1,500		
		NF-TJ01	2,000	2,000	2,000	2,000	2,000	2,000	750		
		NF-TR01	4,000	4,000	4,000	4,000	4,000	4,000	1,800		
		NF-TK77	4,000	4,000	4,000	4,000	4,000	4,000	2,000		
		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	−40～350°C	NF-TA03
		NF-TB02	4,000	4,000	4,000	4,000	4,000	4,000	1,200		
		NF-TB06	4,000	4,000	4,000	4,000	4,000	4,000	1,200		
		NF-TJ01	2,000	2,000	2,000	2,000	2,000	2,000	600		
		NF-TR01	4,000	4,000	4,000	4,000	4,000	2,000	800		
		NF-TK77	4,000	4,000	4,000	4,000	4,000	2,000	600		
		NF-TH01	4,000	4,000	4,000	4,000	4,000	2,000	1,200		
		NF-TH08	4,000	4,000	4,000	4,000	4,000	2,000	800		
		NF-TH10	2,000	2,000	2,000	2,000	2,000	2,000	750		
		NF-TH11	2,000	2,000	2,000	2,000	2,000	2,000	1,000		
	SUS Case 	NF-TB01	4,000	4,000	4,000	4,000	4,000	2,500	800	−40～100°C	NF-TA01S
		NF-TB02	4,000	4,000	4,000	4,000	4,000	4,000	1,800		
		NF-TB06	4,000	4,000	4,000	4,000	4,000	4,000	1,500		
		NF-TJ01	2,000	2,000	2,000	2,000	2,000	2,000	650		
		NF-TR01	4,000	4,000	4,000	4,000	4,000	4,000	1,800		
		NF-TK77	4,000	4,000	4,000	4,000	4,000	4,000	2,000		
		NF-TH01	4,000	4,000	3,200	2,700	2,500	1,400	500		
Super Long distance	Heat resistant 	NF-TB01	4,000	4,000	4,000	4,000	4,000	4,000	4,000	−60～350°C	NF-TA04
		NF-TB02	4,000	4,000	4,000	4,000	4,000	4,000	4,000		
		NF-TB06	4,000	4,000	4,000	4,000	4,000	4,000	4,000		
		NF-TJ01	2,000	2,000	2,000	2,000	2,000	2,000	2,000		
		NF-TR01	4,000	4,000	4,000	4,000	4,000	4,000	4,000		
		NF-TK77	4,000	4,000	4,000	4,000	4,000	4,000	4,000		
		NF-TH01	4,000	4,000	4,000	4,000	4,000	4,000	4,000		
		NF-TH08	4,000	4,000	4,000	4,000	4,000	4,000	4,000		
		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		
Side view		NF-TB01	3,600	2,500	2,000	1,600	1,200	650	200	−40～70°C	NF-TA02
		NF-TB02	4,000	3,500	3,000	2,400	1,800	1,000	300		
		NF-TJ01	4,000	1,900	1,600	1,500	950	600	200		
		NF-TR01	4,000	3,300	2,400	2,000	1,500	900	200		
		NF-TK77	4,000	3,500	3,000	2,400	1,800	950	300		
	Heat resistant 	NF-TB01	4,000	2,400	2,300	2,000	1,200	800	250	−60～300°C	NF-TA05
		NF-TB02	4,000	2,400	2,300	2,000	1,200	800	250		
		NF-TJ01	4,000	1,900	1,700	1,500	950	600	200		
		NF-TR01	4,000	1,700	1,600	1,300	850	550	160		
		NF-TK77	4,000	1,900	1,700	1,500	950	600	200		
		NF-TH01	4,000	1,500	1,300	1,200	800	450	160		
		NF-TH08	4,000	1,600	1,500	1,200	800	550	170		
		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		

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH

	Dimentions (mm)	Applicable fiber cable	Sensing distance(mm)				Operation temperature	Part number
			D2RF			BRF		
			Long	Std	Fast			
Long distance		NF-TB01	3,500	3,500	1,500	3,000	−40～100°C	NF-TA01
		NF-TB02	3,500	3,500	1,500	3,500		
		NF-TB06	3,500	3,500	3,500	3,500		
		NF-TJ01	1,500	1,500	1,500	1,500		
		NF-TR01	3,500	3,500	3,000	3,000		
		NF-TK77	3,500	3,500	3,000	3,500		
		NF-TH01	3,500	3,500	2,500	3,500		
	Heat resistant 	NF-TB01	3,500	3,500	600	3,500	−40～350°C	NF-TA03
		NF-TB02	3,500	3,500	3,000	3,500		
		NF-TB06	3,500	3,500	2,800	3,500		
		NF-TJ01	1,500	1,500	1,500	1,500		
		NF-TR01	3,500	3,500	2,000	2,500		
		NF-TK77	3,500	3,500	1,700	3,500		
		NF-TH01	3,500	3,500	2,700	3,500		
		NF-TH08	3,500	3,500	1,900	2,100		
		NF-TH10	1,500	1,500	1,500	1,500		
		NF-TH11	1,500	1,500	1,500	1,500		
	SUS Case 	NF-TB01	3,500	3,500	1,500	3,000	−40～100°C	NF-TA01S
		NF-TB02	3,500	3,500	1,500	3,500		
		NF-TB06	3,500	3,500	3,500	3,500		
		NF-TJ01	1,500	1,500	1,500	1,500		
		NF-TR01	3,500	3,500	3,000	3,000		
		NF-TK77	3,500	3,500	3,000	3,500		
		NF-TH01	3,500	3,500	2,500	3,500		
Super Long distance	Heat resistant 	NF-TB01	3,500	3,500	3,500	3,500	−60～350°C	NF-TA04
		NF-TB02	3,500	3,500	3,500	3,500		
		NF-TB06	3,500	3,500	3,500	3,500		
		NF-TJ01	1,500	1,500	1,500	1,500		
		NF-TR01	3,500	3,500	3,500	3,500		
		NF-TK77	3,500	3,500	3,500	3,500		
		NF-TH01	3,500	3,500	3,500	3,500		
		NF-TH08	3,500	3,500	3,500	3,500		
		NF-TH10	1,500	1,500	1,500	1,500		
		NF-TH11	1,500	1,500	1,500	1,500		
Side view		NF-TB01	1,500	800	400	600	−40～70°C	NF-TA02
		NF-TB02	1,500	1,000	450	600		
		NF-TJ01	1,500	800	450	500		
		NF-TR01	1,000	700	450	500		
		NF-TK77	1,500	800	450	600		
	Heat resistant 	NF-TB01	1,800	900	400	500	−60～300°C	NF-TA05
		NF-TB02	1,800	900	400	500		
		NF-TJ01	1,300	600	300	400		
		NF-TR01	1,100	600	250	350		
		NF-TK77	1,300	600	300	400		
		NF-TH01	1,000	500	250	400		
		NF-TH08	1,100	600	250	350		
		NF-TH10	700	300	180	300		
		NF-TH11	900	500	250	350		

Operating humidity is 35~85%RH. Please use in 0~40 deg.C when it's 85%RH

NOTES

Please use this product correctly.

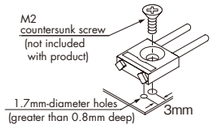
Do not use this product as a protective detection device.

Mounting

Mounting Fibers With Positioning Bosses

NF-DC08

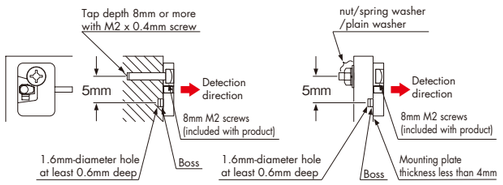
Use M2 countersunk screws (not included with this product).
The boss insertion holes on the bottom surface need to be 1.7mm in diameter and at least 0.8mm deep.



NF-TE01/NF-DE01
(Flat-On Type)

When screwing a tap into the attachment

When using the attached screws and nuts

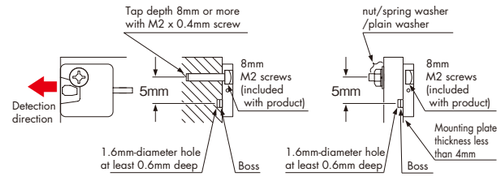


(Note 1): The NF-TE01 is pictured above. NF-DE01 is mounted in the same way.
(Note 2): Through beam fibers have the same dimensions. Be aware of the positions of the screw holes and boss holes when mounting fibers.

NF-TE02/NF-DE02
(Head-On Type)

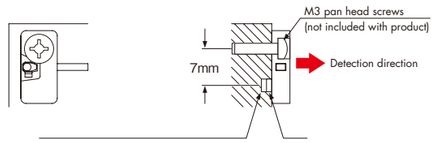
When screwing a tap into the attachment

When using the attached screws and nuts



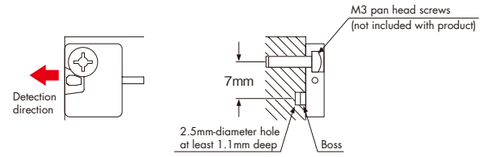
(Note 1): The NF-TE02 is pictured above. NF-DE02 is mounted in the same way.
(Note 2): Through beam fibers have the same dimensions. Be aware of the positions of the screw holes and boss holes when mounting fibers.

NF-TE03/NF-DE03
(Flat-On Type)



(Note 1): The NF-TE03 is pictured above. NF-DE03 is mounted in the same way.
(Note 2): Through beam fibers have the same dimensions. Be aware of the positions of the screw holes and boss holes when mounting fibers.

NF-TE04/NF-DE04
(Head-On Type)

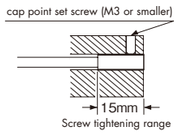


(Note 1): The NF-TE04 is pictured above. NF-DE04 is mounted in the same way.
(Note 2): Through beam fibers have the same dimensions. Be aware of the positions of the screw holes and boss holes when mounting fibers.

Mounting NF-DR09/ -RR01

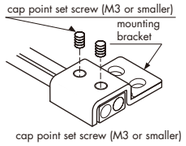
When not using mounting bracket NF-DA51
(included with this product)

Screw set screws within 15mm of the tip of the metal head.



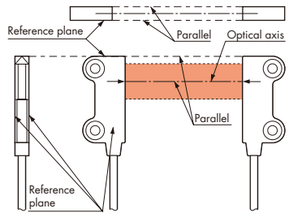
When using mounting bracket NF-DA51
(included with this product)

You can mount the heads without using set screws.
If you use set screws, mount the heads with M3 cup-point set screws.



Mounting Through beam Screen Fibers (NF-TZ01/ -TZ02/ -TZ03/ -TZ04)

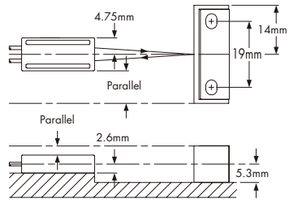
Please take care when mounting this product because its aperture angle is extremely small, and there are cases where the fibers do not transmit light because of the way they were mounted.
As shown in the diagram below, determine a reference plane, make sure the optical axis is aligned properly, and mount the receiving and emitting fibers so that they are parallel to the reference plane.



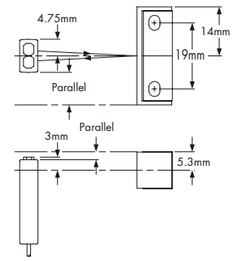
Mounting NF-RB01/-RB02

This product's aperture angle is extremely small, and there are cases where the fibers do not transmit light because of the way they were mounted.
As shown in the diagrams below, mount the fiber heads and reflectors so that their centers align with one another. Make sure that the optical axis is aligned properly.

Head-On Type/NF-RB01

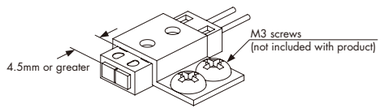


Side-On Type/NF-RB02



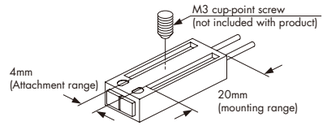
When mounting fiber bracket

Attach fiber bracket to side-on type fibers such that they do not touch the detectors.
If you use fiber bracket, you can mount fibers without using M3 set screws.



When mounting with M3 cup-point set screws

Mount the fibers with M3 cup-point set screws within the mounting ranges shown in the diagram below.

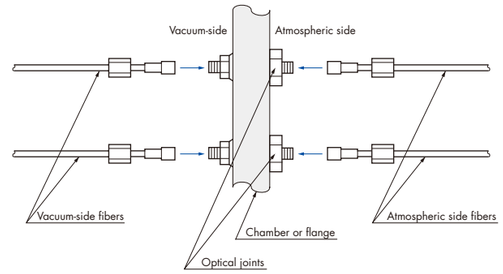


A Note About NF-RB01/-RB02

Detection results may vary between 0 and 20mm from the detection surface when detecting transparent objects.

Mounting Vacuum-Resistant Fibers (NF-TN01/-TF02)

The Structure of Vacuum-Resistant Fibers

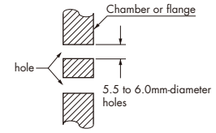


Leak: 1.33x10-10Pa•m3/s [He] or lower

Mounting

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

(Note 1): Make the holes 5.5 to 6.0mm in diameter.



② Mount NF-VN02 optical joints to the vacuum chamber wall.
You must attach the O-ring included with this product, and make sure that the O-ring is on the outside of the vacuum chamber.

③ Mount NF-VN01 fiber bracket to the NF-VN02 optical joint at atomospheric side.

(Note 1): Tighten the nut well.
If the nut is loose, there may be a gap, and the detection distance will drop.

④ Mount the vacuum fiber nut to NF-VN02 optical joint at vacuum side.

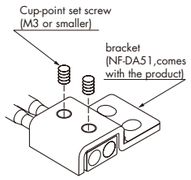
(Note 1): Tighten the nut well.
If the nut is loose, there may be a gap, and the detection distance will drop.

⑤ Mount the tip of the vacuum-side fiber.

For NF-DN01

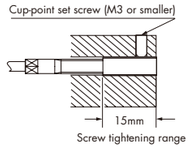
When using bracket

Use cup-point set screws (M3 or smaller) to mount the bracket.
You can mount the head without using cup-point set screws by attaching the bracket to the steel head.



When not using brackets

Use cup-point set screws (M3 or smaller) for mounting within 15mm of the tip of the head as shown in the diagram to the right.



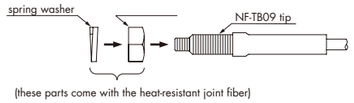
Mounting Heat-Resistant Joint Fibers (NF-TH12/-TH13/-TH14/-TH15/-TH16)

Connecting heat-resistant joint fibers to ordinary-temperature side fibers (NF-TB09)

To connect heat-resistant joint fibers to NF-TB09, follow the instructions below.

Instructions

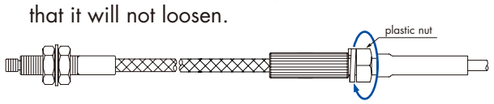
① Attach the plastic nut that comes with the heat-resistant fiber and spring washer to the tip of NF-TB09, pushing them back as far as they will go.



② Attach the heat-resistant joint fiber to the NB-TB09 with a locknut.

(Note 1): Do not screw up the locknut against the plastic nut.

③ Screw up the plastic nut against the locknut so that it will not loosen.



When mounting connecting parts to the mounting plate

To mount the parts that connect the heat-resistant joint fiber and NF-TB09 to the mounting plate with metal nuts, follow the instructions below.
The mounting plate thickness needs to be 1mm or thinner.

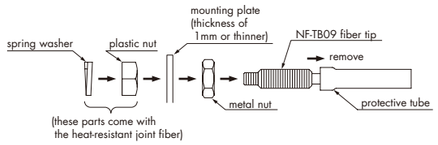
Instructions

① Remove the protective tube from NF-TB09, attach the metal nut to the tip of the fiber and move it down to the fiber part.

② Insert the tip of the fiber through the mounting plate.

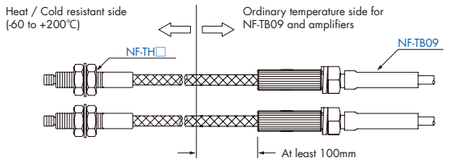
③ Follow the instructions from <Connecting heat-resistant joint fibers to NF-TB09> to connect the heat-resistant joint fiber to NF-TB09.

④ Tighten the metal nut from the first step of these instructions against the mounting plate.



Operating Temperature

Keep the heat-resistant joint fiber at least 100mm from the boundary of the ordinary-temperature side in order to protect NF-TB09 and amplifiers.



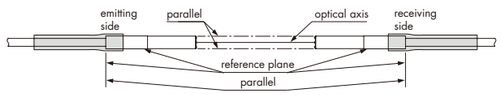
Mounting Narrow Beam/Wafer Mapping Fibers (NF-TG01/-TG02/-TG03/-TG04)

Please take care when mounting this product because its aperture angle is extremely small, and there are cases where the fibers do not transmit light because of the way they were mounted.

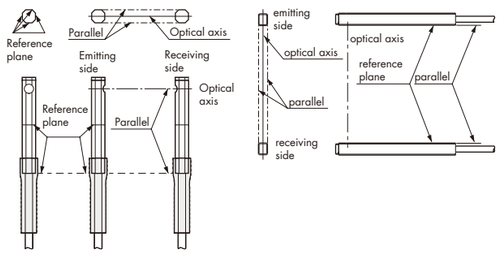
Through beam Type

As shown in the diagram below, determine a reference plane, make sure the optical axis is aligned properly, and mount the receiving and emitting fibers so that they are parallel to the reference plane.

NF-TG01

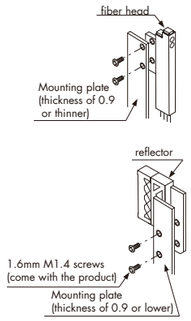


NF-TG02/-TG03/-TG04

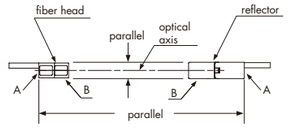


Reflective Type

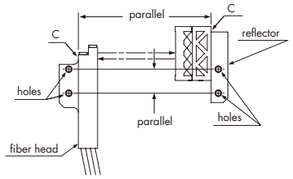
Use 1.6mm M1.4 screws to mount the fiber head and reflector to the mounting plate as shown in the diagram on the right. The mounting plate needs to have a thickness of 0.9mm or thinner.
Use a thread lock compound to tighten screws when mounting them in places with vibrations or shocks.
Attach the parts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



Overhead View

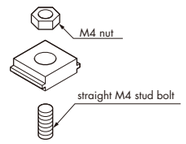


Side View

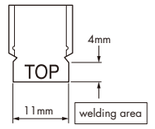


Mounting Leak Detection Fibers (NF-DW02)

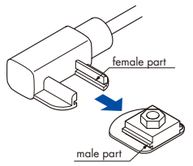
If you are using an SUS bracket, thread a welded M4 stud bolt through the hole on the bracket and attach an M4 nut (not included with this product).



If you are using a PVC bracket, glue it to the mounting surface such that the side with “TOP” etched into it is facing up and glue it within the welding area as shown in the diagram on the right.

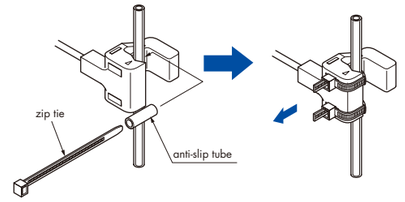


Slide the male part of the bracket attached to the steel case into the female part on the fiber until you hear them click.

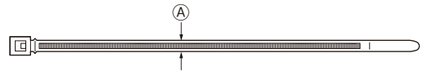


Mounting Pipe-Mounted Fluid Level Detection Fibers (NF-TF01)

Use zip ties and anti-slip tubes to mount the clamp to the pipe as shown in the diagram below.
Use two zip ties on the upper and lower part of the clamp to attach it securely to the pipe. Cut off the extra part of the zip ties that stick out.

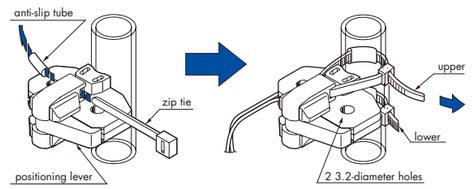


We recommend using zip ties of a thickness 2.5mm or smaller as shown in the diagram below.

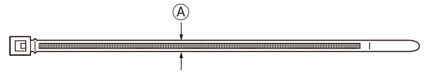


Mounting Pipe-Mounted Fluid Level Detection Fibers (NF-DF04/-DF05)

Use zip ties and anti-slip tubes to mount the clamp to the pipe as shown in the diagram below. Make sure that the positioning lever is in the closed position as shown below when you mount the clamp. Use two zip ties on the upper and lower part of the clamp to attach it securely to the pipe. Cut off the extra part of the zip ties that stick out.



We recommend using zip ties of a thickness 2.5mm or smaller as shown in the diagram below.



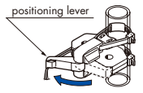
You must use M3 screws, plain washers and spring washers when using the holes for mounting.
(These parts are not included with this product)

Positioning Pipe-Mounted Fluid Level Detection Fibers

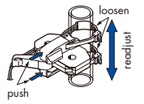
You can easily readjust the attachment position when using zip ties to mount this product.

How to Adjust Position

① Pull the positioning lever open, in the direction of the arrow.



② Push the moveable part in the direction of the arrow, loosen the zip tie, and readjust the mounting position.

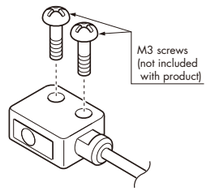


③ Close the positioning lever so that it will not loosen.

(Note 1) : You must reset the sensitivity after readjusting the mounting position.
(Note 2) : The positioning lever is for readjusting the position on this device, not for tightening the zip ties. Tightening the zip ties while the positioning lever is open and then closing the lever will damage the fibers.

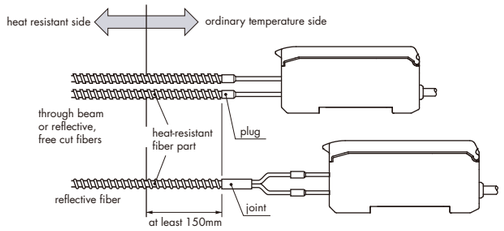
Mounting Chemical-Resistant Angled-Head Fibers (NF-TY05)

Use M3 screws and tighten them to torques of 0.3Nm or smaller.



Caution for Heat-Resistant Fibers

Keep the heat-resistant fiber part at least 150mm from the boundary of the ordinary-temperature zone as shown below in order to protect amplifiers.



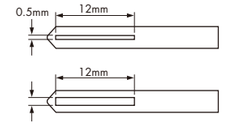
Do not directly expose amplifiers to radiation heat or hot air.
The metal bracket on the tip of the heat-resistant fiber (up to 350℃) and stainless steel sheath may change color when used at high temperatures, but this does not affect their detection capability.

Notes about Adhesive Slits Included With NF-TZ01/-TZ02 /-TZ03/-TZ04

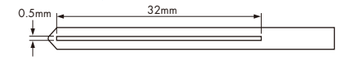
There are two types of slits that come with these products (the slit that comes with the NF-TZ01/ -TZ02 is one of them). These slits help detecting tiny objects and prevent saturation when using the fibers at close range. However, applying adhesive slits shortens the detection distance.
Align the pointed end of the adhesive slit to the top of the fiber and apply it as shown in the diagram below.

Adhesive Slits (come with products)

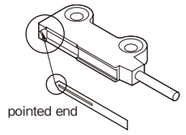
NF-TZ03/-TZ04



NF-TZ01/-TZ02



How to Apply Adhesive Slits

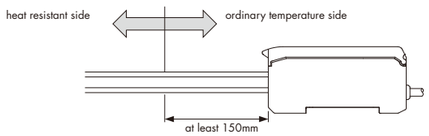


Notes about NF-TY01(-□) /-TY02(-□)/-TY03-TF03/-TY04 /-TY05(-□)/-DY01(-□)

Do not use these products with the chemicals listed below.
Fused alkali metals (sodium, potassium, lithium, etc.), fluorine gas (F2), ClF3, OF2 (even in its gaseous state) and other chemicals that may erode PFA. Hydrofluoric acid at high temperatures, nitric acid, chlorine and other chemicals with high permeability.

Mounting Chemical-Resistant Angled-Head Fibers (NF-TY05)

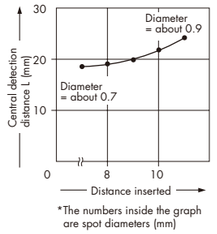
Keep the heat-resistant fiber part at least 150mm from the boundary of the ordinary-temperature zone as shown below in order to protect amplifiers.

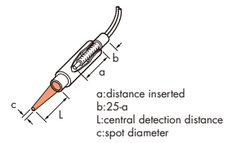


Do not directly expose amplifiers to radiation heat or hot air.

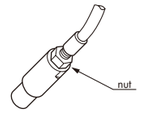
Notes about NF-DA06

You can adjust the spot diameter and detection distance by changing the amount of fibers inserted, but if you jam the fibers in too far, the tip of the fibers will become separated from the lens.

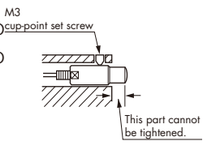




Tighten the fiber nut after setting the fiber and NF-DA06 in place in order to fix them so that they do not move because of vibrations, etc.

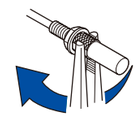


Use M3 cup-point set screws to mount NF-DA06 if you want to use set screws.



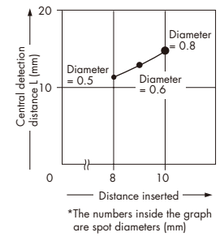
Notes about NF-DA01/-DA02 /-DA03/-DA04/-DA05

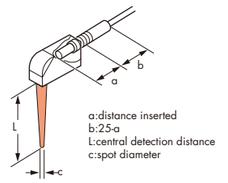
Insert fibers into NF-DA01/ -DA02/ -DA03/ -DA04/ -DA05 as far as they will go.



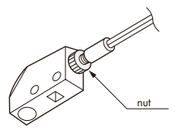
Notes about NF-DA07

You can adjust the spot diameter and detection distance by changing the amount of fibers inserted.





Tighten the nut after setting the fiber and NF-DA07 in place in order to fix them so that they do not move because of vibrations, etc.



Notes about Leak/Fluid Level /Chemical-Resistant Fibers

To clean NF-DW02, use a soft cloth to wipe away all liquid on the head and bracket. Be sure to check for condensation on the detector.

If the fibers on NF-DW02/ -TF01 are too short, the detector may not receive the correct amounts of light and may not be able to detect consistently.

Use the bracket designed especially for the NF-DW02 in order to avoid mistakes such as forgetting to attach something. Otherwise, the detector may not be able to detect consistently.
If you use a PVC bracket on the black mat parts on the steel case, the device cannot detect mistakes, so perform a thorough check before using the device.

Be careful not to damage exterior of the fibers when you cut the protective tubes.

Only set NF-DW02 sensitivity after mounting the completely dry head to the bracket and attaching the fibers to the amplifier. Adjusting the fiber connection or position after adjusting sensitivity changes the amount of light that enters and causes inconsistent detection.
If you altered fiber connection or position while cleaning the device, make sure to adjust amplifier sensitivity.

The amount of light may decrease when the device is used for long periods of time at high temperature and humidity.

Liquids that are not compatible with NF-DW02 head material (PFA) may cause air bubbles to flood the detector. This causes inconsistent detection, or makes consistent detection take more time. Test the liquid you are examining before beginning.

Make sure that the NF-DW02 bracket does not have any scratches, dirt or grime, or deformities when you clean it.

Water droplets on the detection surface may affect its detection capability. Avoid using this device in places where it can come into direct contact with water.
Remember to check for condensation on the outside of pipes.

There are some opaque or viscous liquids that NF-TF01/ -DF04/ -DF05 cannot consistently detect.

When mounting of NF-TF01/ -DF04/ -DF05 is not good enough, it may not be able to detect objects consistently. Use the anti-slip tube that comes with the product to attach it to the pipe so that the detector does not move.

For consistent detection with NF-TF01, set amplifier sensitivity after attaching fibers while there is no liquid inside the pipe. You must reset sensitivity if you have adjusted the fibers on the pipe and have changed their position.

NF-DF04/ -DF05 cannot detect properly on opaque pipes.

Attach the NF-DF04/ -DF05 detector firmly to the pipe. It will malfunction if it is not attached firmly.

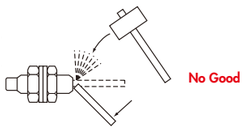
NF-DF04/ -DF05 is not water- or chemical-resistant. Do not use it in places where it may come into direct contact with water or chemicals.

Water droplets on the NF-DF04/ -DF05 detection surface, water droplets that run into the pipe, and air bubbles will affect detection. Check for condensation on the outside of pipes.

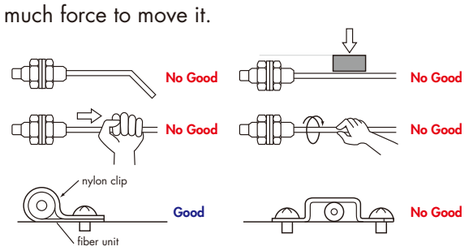
General Precautions

Precautions for Fiber Units

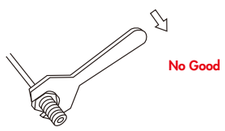
1. Do not hit the detection head surface against anything or damage it in any other way.



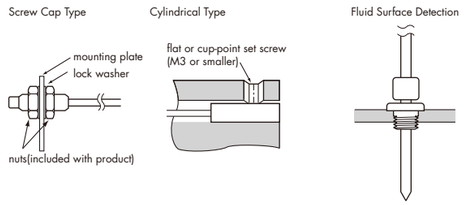
2. Do not bend or twist the fiber head or use too much force to move it.



3. Do not apply too much torque to the sensor head or use tools that were not designed for the nuts.



4. Mount sensor heads according to the type of fiber as shown in the diagrams below.

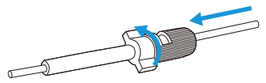


5. Cut the tips of cuttable fiber units with special fiber cutters before attaching fiber amplifier when needed.

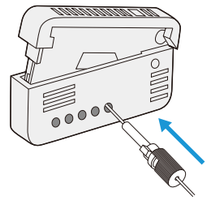
Precautions for Fiber Cutters

1. Cutting Instructions

① Adjust the length in the direction of the arrow and spin the stopper to lock the fiber.



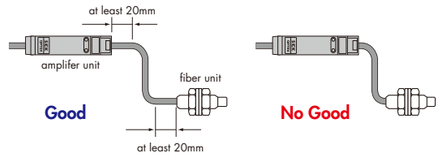
② Insert the fiber into the fiber cutter and cut it.



③ The diagram on the right shows a properly-cut fiber.

2. Make the fiber unit bending radius greater than the allowable bending radius. Bending it too much shortens the detection distance.

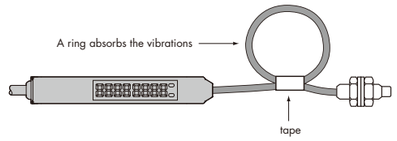
3. Leave some straight line near the insertion part and the tip of the fiber unit.



4. The detection distance may drop 20% or so because of the cut surface of the fiber or the connection with the amplifier. We recommend using the device at or below 80% of the detection distance on the spec.

5. In places with a lot of vibrations, mount the fiber unit so that it does not vibrate. Pay special attention that the vibrations do not reach the connection between the fibers and amplifier.

6. Use the following method to soften fiber head vibrations.



7. Do not use fiber units that are not protected by fluoroplastic in environments with organic solvents.

8. Do not bend the tip or the base of the sleeve.