Product catalog Vol.7

What the product was loaded with is the Japanese technology and hospitality.

www.optex-fa.com

Attention: Not to be Used for Personnel Protection.

Never use these products as sensing devices for personnel protection.
Doing so could lead to serious injury or death.
These sensors do not include the self-checking redundant circuitry necessary to allow their use in personnel safety applications.
A sensor failure or malfunction can cause either an energized or de-energized sensor output condition.
Please consult our distributors about safety products which meet OSHA, ANSI and IEC standards for personnel protection.

- **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.**

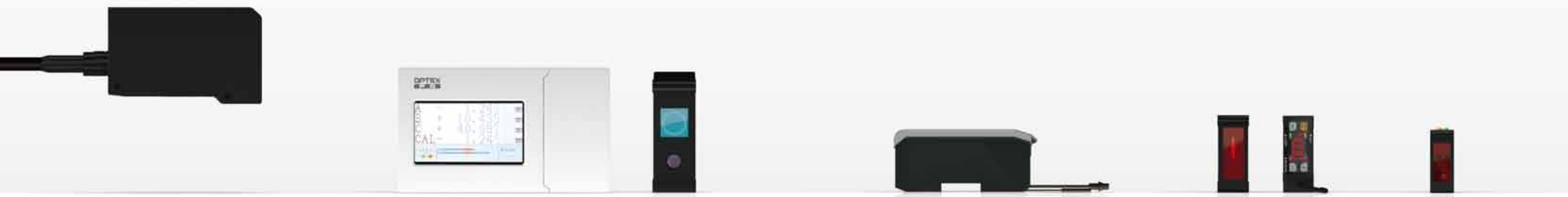
OPTEX FA CO., LTD.
600-8815 Kyoto, Shimogyo, Chudoji Awata 91, Japan
TEL. +81-(0)75-325-1314 FAX. +81-(0)75-325-2921
http://www.optex-fa.com

74568-07-QL1408

OPTEX FA CO., LTD.

Cost efficient Unique Sensors

Product catalog vol.7



Optex FA's sensors

Optex FA provides various photoelectric sensors including laser sensors, fiber sensors and cost effective displacement sensors worldwide for factory automation.

We also provide vision sensors and LED lightings for machine vision solution.
(refer our homepage: www.optex-fa.com)

All lineup catalog

Contents

Adding new value to factory automation sensors

It is by exceeding expectations that we win trust. It is through perseverance that we form ties.
At FASTUS, in addition to providing exceptional quality, competitive prices, and top-notch service, it is our mission to create impressive products and services by always listening to the inner voice of the customer and comparing it against our values. We hope to continue to be a company that continues to create added value for factory automation sensors.
This is the brand promise entrusted to each and every FASTUS employee.

The aesthetics of addition according to FASTUS

At FASTUS we define addition as being simply the pursuit of our clear vision for the future.
We are dedicated to offering products and services with high added value and ensuring that they are priced appropriately so as to satisfy our customers.
When adding to something, we always ask ourselves if there is a universal value in doing so.
With a discriminating eye, we eliminate waste and select only what is necessary.

While there may be many companies in the world that pride themselves on the quality of the items they produce, at FASTUS we are not satisfied with simply creating top quality products.
We never compromise in any aspect of price, quality, and service.
In pursuit of our aims of delivering better products, creating a more sought-after brand, and becoming a unique and irreplaceable presence in the industry, we will seek out challenges that only we are capable of accomplishing.

Following a customer-focused strategy, we will create new innovations with a future-oriented outlook without being held back by preconceived ideas.
We are FASTUS.

FASTUS

Good Thinking, Good Future

The value that the FASTUS brand aims to provide

01 | SOLUTIONS
We will provide our customers with optimal solutions and add value.

02 | PRODUCTS
We will add industry-leading value or one-of-a-kind value to our products.

QUALITY : Industry-leading quality and performance.
PRICE : Towards becoming the industry price leader.
QUICK RESPONSE : Same-day shipment offered for 100% of standard products.

03 | SUSTAINABILITY
We will add value to society and the environment through our products.

Product Index

Product Index

Product Index

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Alphabetical Index

Alphabetical Index

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T

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V

Y

Z

New products

NEW Products provide better production efficiency.

Photoelectric Sensors

Low cost / Small type

Z3 series FASTUS

- Longest-in-class sensing distance of 25m (through-beam type).
- Significantly reduced dead zone (diffuse-reflective type).
- Indicators clearly visible from anywhere.

more detail P87

Fiber Sensors

THREAD TYPE

NF-TR14

- New concept design of Straight-view and Side-view switchable type.
- Switch from Straight-view to Side-view by fixing the cable in the channel at the side of the nut.
- Easy mounting by changing direction of the cable.

more detail P186

Laser Sensors

Accurate Laser BGS sensor with digital display

BGS-HL series FASTUS

- Minimum detectable height difference = 0.08 mm (BGS-HL05**).
- Built-in controller 4 Digit display.
- Stable detection regardless object color.

more detail P123

Accurate Time Of Flight BGS sensor

TOF series

- TOF, Time Of Flight, is one of methods to measure the distance by measuring time to the object.
- TOF sensor can measure the distance to the object regardless its color and angle.

more detail P130

Displacement Sensors

2D displacement sensor

LS series FASTUS

- Linearity ±0.1% of F.S.
- Sampling period 0.5 ms (max. speed).
- Superbly affordable 2D measurement.

more detail P256

Small and low cost displacement sensor with digital display

CD22 series FASTUS

- One of the World's Smallest Displacement Sensors!!
- Innovative size! Fits in any machine.
- Perfomance like High end.
- Repeatability 1μm. (CD22-15□□)

more detail P303

Obsolete products and suitable replacement

Photoelectric Sensors / Laser Sensors

Obsolete product	When discontinued	Suitable replacement	Page
BGS-H15***	Discontinued in June 2014	None	-
BGS-S15***	Discontinued in June 2014	BGS-Z10***	77
BGS-V2000*	Discontinued in June 2014	TOF-3V300**	132
BGS-V30**	Discontinued in December 2013	BGS-2V30**	58
BGS-V50**	Discontinued in December 2013	BGS-2V50**	58
BGS-V80**	Discontinued in December 2013	BGS-2V100**	58
V2T-2000***	Discontinued in December 2013	V2T-7000***	58
V2R-800***	Discontinued in December 2013	V2R-1200***	58
J2D-H10***	Will be discontinued in 2014	None	-
J2D-S10***	Will be discontinued in 2014	ZD-L40***	157
J2D-H70***	Will be discontinued in 2014	None	-
J2D-S70***	Will be discontinued in 2014	Z2D-80***	85
J2D-H100***	Will be discontinued in 2014	None	-
J2D-S100***	Will be discontinued in 2014	None	-
J3M-GH01***	Will be discontinued in 2014	None	-
J3M-GS01***	Will be discontinued in 2014	DM-18T** as mark sensor	117
BGS-3JS05***	Discontinued in February 2012	BGS-ZL10***	158
BGS-D10***	Discontinued in December 2012	BGS-DL10T***	135
BGS-D30***	Discontinued in December 2012	BGS-DL25T***	135
FGS-D10***	Discontinued in December 2012	BGS-DL10T***	135
FGS-D30***	Discontinued in December 2012	BGS-DL25T***	135

Fiber Sensors

Obsolete product	When discontinued	Suitable replacement	Page
VRF-T**	Discontinued in September 2008	D3RF-T**/D2RF-T**	168
VGF-T**	Discontinued in September 2008	D2GF-T**	174
JRF-T**	Discontinued in March 2008	D3RF-T**/D2RF-T**	168
NF-TZ01	Discontinued in December 2011	NF-TZ07	200
NF-TZ02	Discontinued in December 2011	NF-TZ08	213
NF-TZ03	Discontinued in December 2011	NF-TZ09	200
NF-TZ04	Discontinued in December 2011	NF-TZ10	213

Displacement Sensors

Obsolete product	When discontinued	Suitable replacement	Page
CD3-***	Discontinued in October 2013	CD33-***/CD22-***	296

Accessories

Obsolete product	When discontinued	Suitable replacement	Page
V-60K	Discontinued in June 2012	None	-
P45	Discontinued in January 2007	P45A	112
V-42F	Discontinued in March 2012	None	-

PHOTOELECTRIC SENSORS

Optex FA is now the second largest supplier of photoelectric sensors in Japan.
Optex provides an extensive selection of sensors to solve most applications.
All sensors are available in Cabled or M8 QD versions and are offered with
a choice of NPN or PNP outputs.

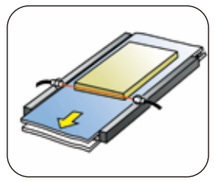
PHOTOELECTRIC SENSORS

Photoelectric Sensor

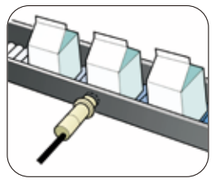
C series

- Epoxy filled housing ensures resistance to vibration.
- M12 QD types are available.
- Rigid Nickel Plated Brass housing.

Applications



Positioning of wooden plate



Counting food packages

Nickel plated brass body, resistant to vibration and damage from chemicals.

Superior in performance to sensors with plastic bodies in terms of durability and resistance to chemicals, oils and mechanical vibration.

CRDF retro-reflection type with built-in polarizing filter.

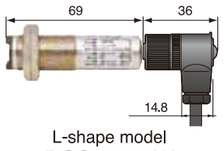
The beam can be turned 90 degrees by using the optional side view attachments.

type T000
for CTD-1500, CDR-300

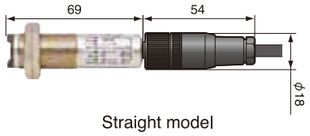
type T110
for CDD-11

type T400
for CDD-40

Optional Straight and 90 degree connectors



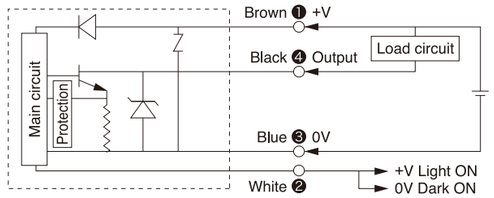
L-shape model
DOS-1204-W



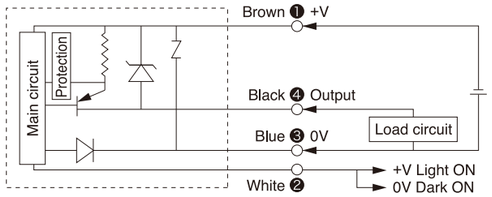
Straight model
DOS-1204-G

Circuit diagram

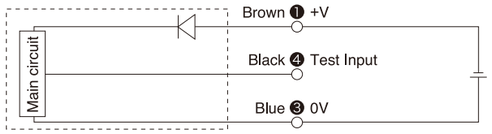
NPN output



PNP output

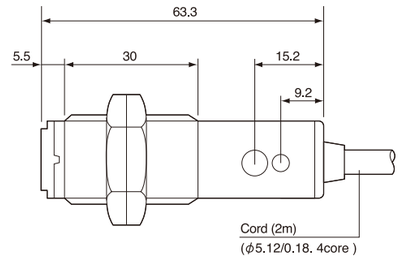


Emitter

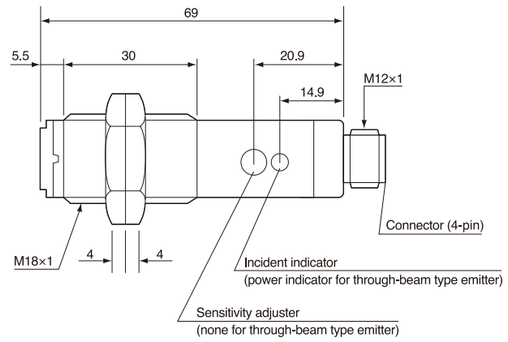


Dimensions

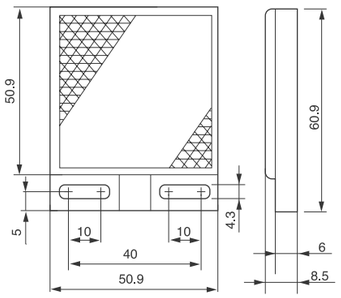
Cable type



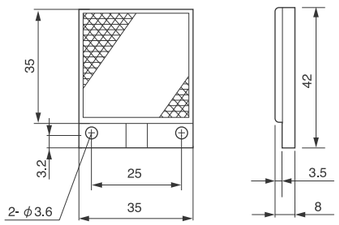
M12 QD type



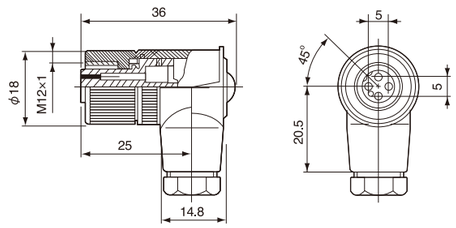
Standard reflector V-61



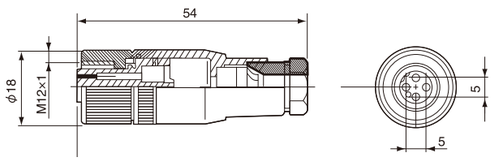
Small reflector V-42



90 degree QD connector DOS-1204-W



Standard QD connector DOS-1204-G



(Unit : mm)

Specifications

Model		Thru-beam	Retro-reflective	Retro-reflective w Polarizing filter	Diffuse reflective 11cm	Diffuse reflective 40cm
Cable type	NPN	CTD-1500N	CRD-300N	CRDF-100N	CDD-11N	CDD-40N
	PNP	CTD-1500P	CRD-300P	CRDF-100P	CDD-11P	CDD-40P
Connector type	NPN	CTD-1500CN	CRD-300CN	CRDF-100CN	CDD-11CN	CDD-40CN
	PNP	CTD-1500CP	CRD-300CP	CRDF-100CP	CDD-11CP	CDD-40CP
Sensing distance		15m	3m	1m	11cm	40cm
Response time		1.5msec Max				
Operating mode		Light ON / Dark ON selectable				
Hysteresis		NIL			10% Max	
Light source		Infrared		Red	Infrared	
Control output		NPN or PNP Open collector, 100mA Max / 30V DC				
Supply voltage		DC 10 to 30V including 10% of ripple				
Conformity		JIS / C4525, CE, UL				
Power consumption		40mA Max	30mA Max			
Operating temp / humidity		–25 up to 55 °C / 35 up to 95% RH				
Sensitivity adjustment		Single turn potentiometer				
Protection category		IEC 144 IP66				
Shock resistance		50G (500m/S^2), X-Y-Z axis 3 times				
Material		Case : BSBM+Ni, Lens : PC				
Reflector		–	V-61		–	

Options

Standard reflector V-61

Small reflector V-42

DOS-1204-W
90 degree QD connector

DOS-1204-G
Standard QD connector

C
C2
E
J
J2
J3
V
V2
V3
V4
SR-Q
S
Z
BGS-Z
Z2
Z3
ZM
K
BGS-2S
Y
DM-18T
Accessory

Photoelectric Sensor

C2 series

Well known for its conventional shape but not conventional in quality. An ultimate cylindrical sensor designed in Japan.

Custom ASIC with Power Circuit

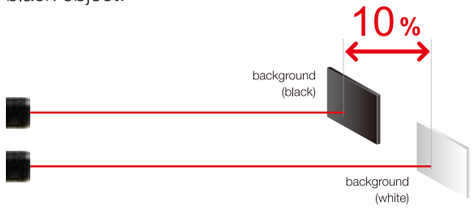
The electronic circuit consists mainly of Optex FA's custom ASIC with only 27 electronic components.
The ASIC contains power circuit and this helps to avoid defects by electric damage from the power line.

RoHS products

Both plastic housing and metal housing are RoHS compliant.
With an Eco-minded electric design, the current consumption is only 18mA (Diffuse type)

Hysteresis of Max 10%. Between black/white colors.

Between black/white colors, hysteresis is Max at 10% (Diffuse type). C2DM-11 gives a sensing distance of 110mm for white object and 90mm for black object.



Trimmer of Silicon plastic for high durability against chemical impact.

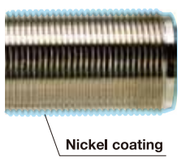
The trimmer is tightly sealed against water with IP67 rating. Silicon plastic trimmer is the best solution against water, oil. chemical and environmental heat.

Easy Alignment and installation

Ample sensing area provides easy alignment when installing the thru-beam sensor. For instance, there is an allowance of 70cm to align the sensor at 10M distance. The highly bright LED is visible at long distance as well.

Nickel coating of 20μ thickness for anti-rust solution.

Metal type consists of brass-nickel housing with extra nickel coating of 20u thickness. This coating is done for the external and internal of the housing. It helps protect the metal housing against rust and toughen it.



BGS type sensors

BGS type sensors are designed to detect any target regardless of the color and/or background.

Durable to 70N (7kg) of tension

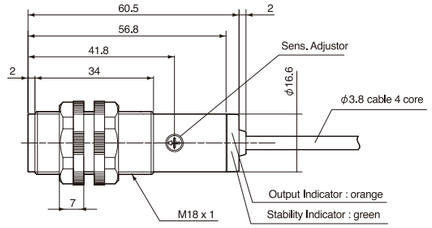
The cable is firmly fixed to the internal circuit board so that it can withstand pulling tension of up to 70N (7kg).

Dimensions

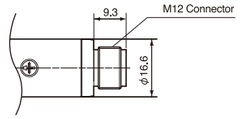
Plastic housing

Standard

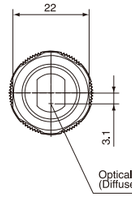
Cable type



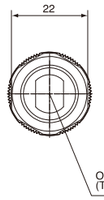
M12 Connector type



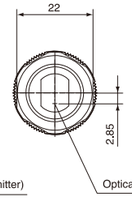
Diffuse-reflective
(110,400,800mm Type)
Thru-beam reciever



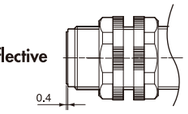
Thru-beam Emitter



BGS



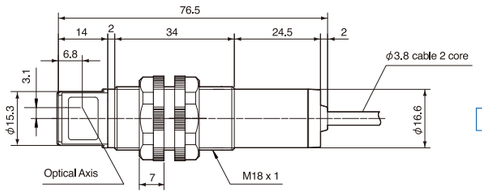
Retro reflective



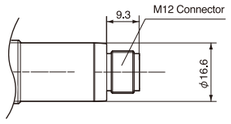
Angle (90 degree)

Cable type

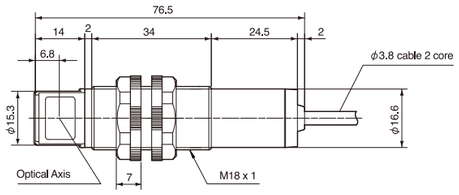
Diffuse-reflective
Thru-beam reciever

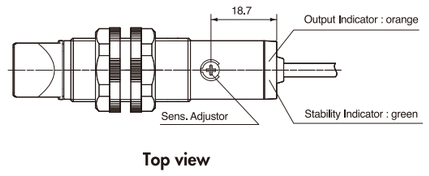


M12 Connector type



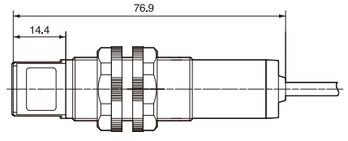
Thru-beam Emitter

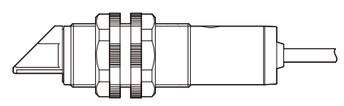




Top view

Retro reflective



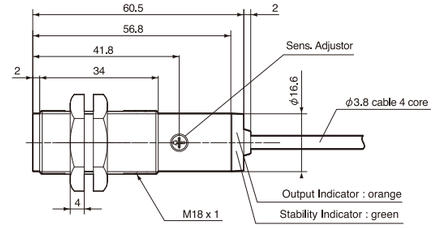


Side view

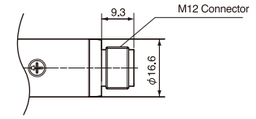
Metal housing

Standard

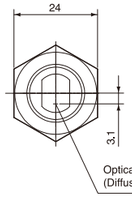
Cable type



M12 Connector type

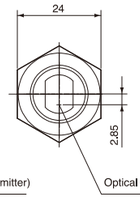


Diffuse-reflective
(110,400,800mm Type)
Thru-beam reciever

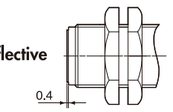


Thru-beam Emitter

BGS



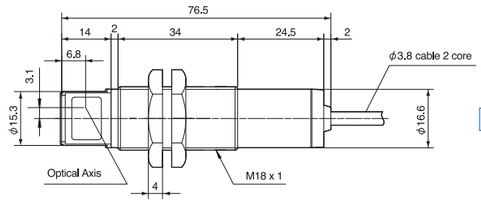
Retro reflective



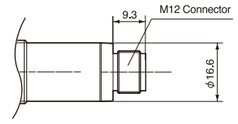
Angle (90 degree)

Cable type

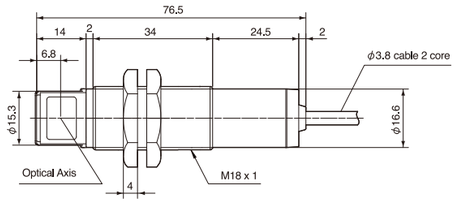
Diffuse-reflective
Thru-beam reciever

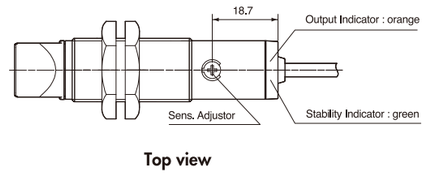


M12 Connector type



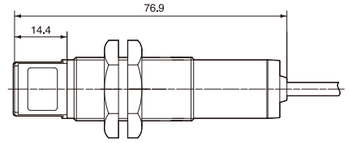
Thru-beam Emitter

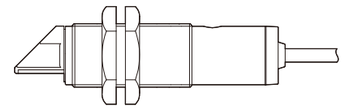




Top view

Retro reflective





Side view

(mm)

Product family

Plastic housing

				Standard	Angle 90°
Retro-reflective Without Polarizing fillter	2m cable	NPN		C2RP-350N	C2RP-S350N
		PNP		C2RP-350P	C2RP-S350P
	M12 connector	NPN		C2RP-350CN	C2RP-S350CN
		PNP		C2RP-350CP	C2RP-S350CP
Retro-reflective With Polarizing fillter	2m cable	NPN		C2RP-F400N	C2RP-SF400N
		PNP		C2RP-F400P	C2RP-SF400P
	M12 connector	NPN		C2RP-F400CN	C2RP-SF400CN
		PNP		C2RP-F400CP	C2RP-SF400CP
Diffuse-reflective Focused 110mm type	2m cable	NPN		C2DP-11N	C2DP-S11N
		PNP		C2DP-11P	C2DP-S11P
	M12 connector	NPN		C2DP-11CN	C2DP-S11CN
		PNP		C2DP-11CP	C2DP-S11CP
Diffuse-reflective Energetic 400mm type	2m cable	NPN		C2DP-40N	C2DP-S40N
		PNP		C2DP-40P	C2DP-S40P
	M12 connector	NPN		C2DP-40CN	C2DP-S40CN
		PNP		C2DP-40CP	C2DP-S40CP
Diffuse-reflective Energetic 800mm type	2m cable	NPN		C2DP-80N	C2DP-S80N
		PNP		C2DP-80P	C2DP-S80P
	M12 connector	NPN		C2DP-80CN	C2DP-S80CN
		PNP		C2DP-80CP	C2DP-S80CP
Thru-beam	2m cable	NPN		C2TP-2000N	C2TP-S2000N
		PNP		C2TP-2000P	C2TP-S2000P
	M12 connector	NPN		C2TP-2000CN	C2TP-S2000CN
		PNP		C2TP-2000CP	C2TP-S2000CP
BGS	2m cable	NPN		BGS-CP30N	–
		PNP		BGS-CP30P	–
	M12 connector	NPN		BGS-CP30CN	–
		PNP		BGS-CP30CP	–

Metal housing

Retro-reflective Without Polarizing fillter	2m cable	NPN		C2RM-350N	C2RM-S350N
		PNP		C2RM-350P	C2RM-S350P
	M12 connector	NPN		C2RM-350CN	C2RM-S350CN
		PNP		C2RM-350CP	C2RM-S350CP
Retro-reflective With Polarizing fillter	2m cable	NPN		C2RM-F400N	C2RM-SF400N
		PNP		C2RM-F400P	C2RM-SF400P
	M12 connector	NPN		C2RM-F400CN	C2RM-SF400CN
		PNP		C2RM-F400CP	C2RM-SF400CP
Diffuse-reflective Focused 110mm type	2m cable	NPN		C2DM-11N	C2DM-S11N
		PNP		C2DM-11P	C2DM-S11P
	M12 connector	NPN		C2DM-11CN	C2DM-S11CN
		PNP		C2DM-11CP	C2DM-S11CP
Diffuse-reflective Energetic 400mm type	2m cable	NPN		C2DM-40N	C2DM-S40N
		PNP		C2DM-40P	C2DM-S40P
	M12 connector	NPN		C2DM-40CN	C2DM-S40CN
		PNP		C2DM-40CP	C2DM-S40CP
Diffuse-reflective Energetic 800mm type	2m cable	NPN		C2DM-80N	C2DM-S80N
		PNP		C2DM-80P	C2DM-S80P
	M12 connector	NPN		C2DM-80CN	C2DM-S80CN
		PNP		C2DM-80CP	C2DM-S80CP
Thru-beam	2m cable	NPN		C2TM-2000N	C2TM-S2000N
		PNP		C2TM-2000P	C2TM-S2000P
	M12 connector	NPN		C2TM-2000CN	C2TM-S2000CN
		PNP		C2TM-2000CP	C2TM-S2000CP
BGS	2m cable	NPN		BGS-CM30N	–
		PNP		BGS-CM30P	–
	M12 connector	NPN		BGS-CM30CN	–
		PNP		BGS-CM30CP	–

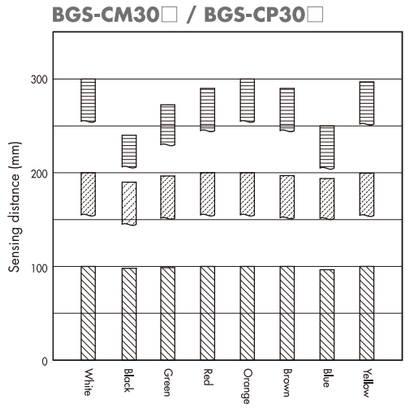
Specifications

Type		Thru-beam	Retro-reflective		Diffuse-reflective			BGS
			With polarizing filter	Without polarizing filter	110mm type	400mm type	800mm type	
Standard								
Plastic housing	2m Cable	C2TP-2000(N,P)	C2RP-F400(N,P)	C2RP-350(N,P)	C2DP-11(N,P)	C2DP-40(N,P)	C2DP-80(N,P)	BGS-CP30(N,P)
	M12	C2TP-2000C(N,P)	C2RP-F400C(N,P)	C2RP-350C(N,P)	C2DP-11C(N,P)	C2DP-40C(N,P)	C2DP-80C(N,P)	BGS-CP30C(N,P)
Metal housing	2m Cable	C2TM-2000(N,P)	C2RM-F400(N,P)	C2RM-350(N,P)	C2DM-11(N,P)	C2DM-40(N,P)	C2DM-80(N,P)	BGS-CM30(N,P)
	M12	C2TM-2000C(N,P)	C2RM-F400C(N,P)	C2RM-350C(N,P)	C2DM-11C(N,P)	C2DM-40C(N,P)	C2DM-80C(N,P)	BGS-CM30C(N,P)
Angle (90 degree)								
Plastic housing	2m Cable	C2TP-S2000(N,P)	C2RP-SF400(N,P)	C2RP-S350(N,P)	C2DP-S11(N,P)	C2DP-S40(N,P)	C2DP-S80(N,P)	-
	M12	C2TP-S2000C(N,P)	C2RP-SF400C(N,P)	C2RP-S350C(N,P)	C2DP-S11C(N,P)	C2DP-S40C(N,P)	C2DP-S80C(N,P)	-
Metal housing	2m Cable	C2TM-S2000(N,P)	C2RM-SF400(N,P)	C2RM-S350(N,P)	C2DM-S11(N,P)	C2DM-S40(N,P)	C2DM-S80(N,P)	-
	M12	C2TM-S2000C(N,P)	C2RM-SF400C(N,P)	C2RM-S350C(N,P)	C2DM-S11C(N,P)	C2DM-S40C(N,P)	C2DM-S80C(N,P)	-
Sensing distance		20m	0.01 ~ 4m (V-61)	0.01 ~ 3.5m (V-61)	11cm *1	40cm *1	80cm *1	300mm *1
Spot size		ϕ1100 mm / 20m	ϕ270 mm / 4m	ϕ240 mm / 3.5m	ϕ8 mm / 11cm	ϕ20 mm / 40cm	ϕ30 mm / 80cm	ϕ15 mm / 300mm
Light source		Red LED		IR LED	Red LED			
Supply voltage		DC10 ~ 30V including ripple (P-P) 10%						
Power consumption		Emitter : 20mA Max	20mA Max					35mA Max
		Receiver : 15mA Max						
Hysteresis		-			10% Max			
Response time		0.5ms Max						1ms Max
Control output		NPN/PNP Open Collector 100mA Max / DC30V Max (Residual voltage Max 1.8V / 100mA Max)						
Operation mode		Light ON / Dark ON selectable by control wires						
Sensitivity adjustment		1 turn pot.						4 turn pot.
LED indicator		Output indicator (Orange LED) / Stability indicator (Green LED)						
Environmental illuminance		Sunlight : 10,000 lux, Incandescent lamp : 3,000 lux Max						
Vibration resistance		10 ~ 55Hz amplitude 1.5mm X-Y-Z each 2 hours						
Shock resistance		500m/S2 (50G) X-Y-Z each 3 times						
Operating / Storage temperature		Operating temperature : – 25 ~ +55 oC (no freezing) / Storage temperature : – 30 ~ +70 oC						
Operating / Storage humidity		Operating humidity : 35 ~ 85%RH / Storage humidity : 35 ~ 95%RH						
Protection / Material		IEC IP67(common to any type) Plastic housing : PBT (glass included) / Metal housing :BSBM, Front Cover , Lens : PMMA						

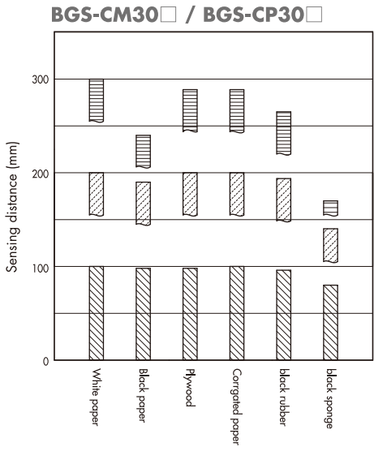
*1 White Paper 90%

BGS Response *common among all the BGS types

Color response



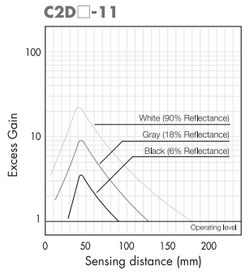
Material response



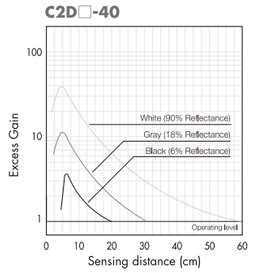
Excess gain *common between plastic / metal housing

Standard Types

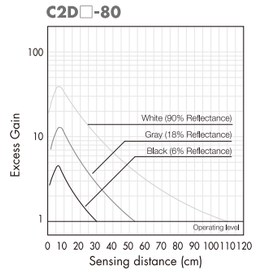
C2D□-11



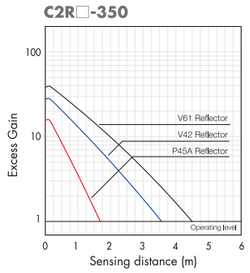
C2D□-40



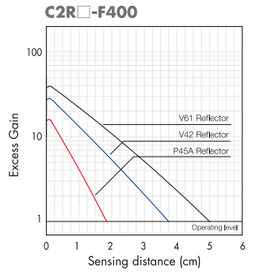
C2D□-80



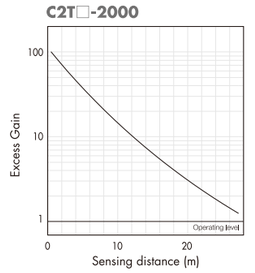
C2R□-350



C2R□-F400

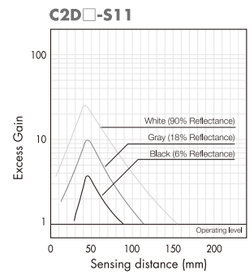


C2T□-2000

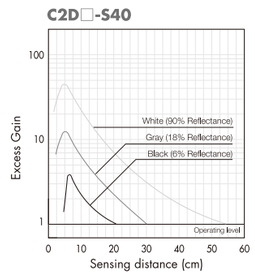


Angle (90 degree)

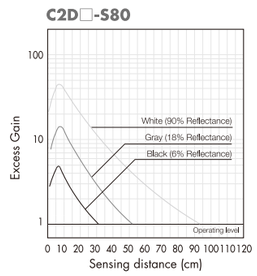
C2D□-S11



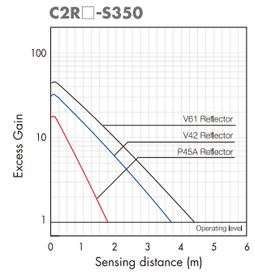
C2D□-S40



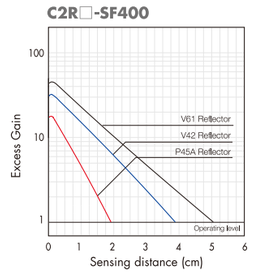
C2D□-S80



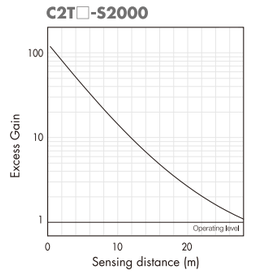
C2R□-S350



C2R□-SF400



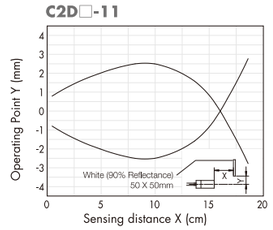
C2T□-S2000



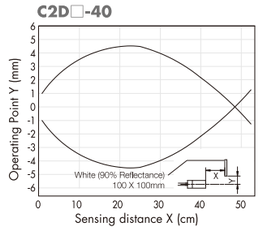
Sensing area *common between plastic / metal housing

Standard Types

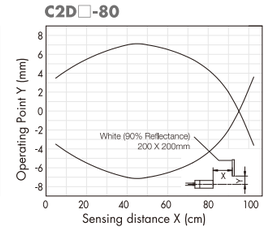
C2D□-11



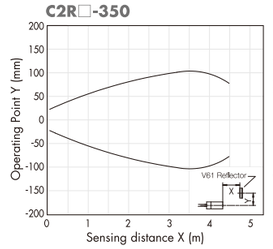
C2D□-40



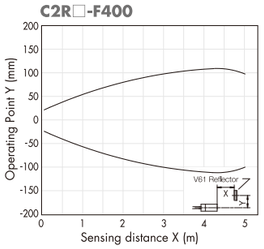
C2D□-80



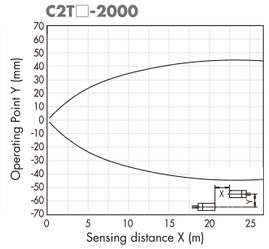
C2R□-350



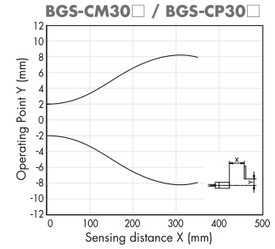
C2R□-F400



C2T□-2000

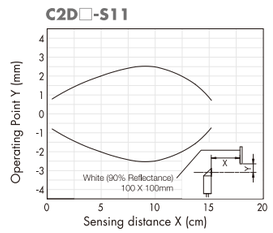


BGS-CM30□ / BGS-CP30□

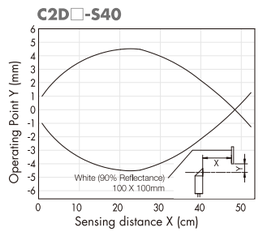


Angle (90 degree)

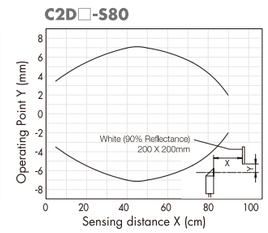
C2D□-S11



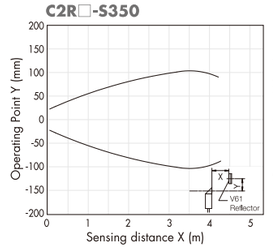
C2D□-S40



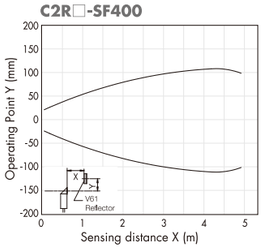
C2D□-S80



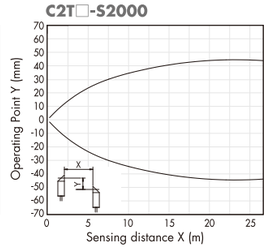
C2R□-S350



C2R□-SF400



C2T□-S2000

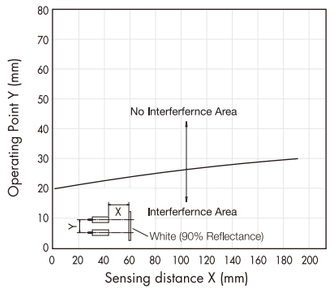


Interference area

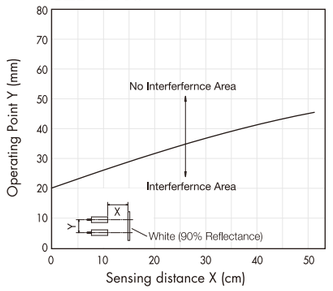
*common between plastic / metal housing

Standard Types

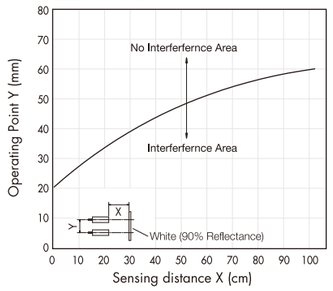
C2D□-11



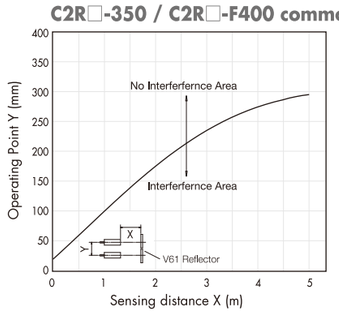
C2D□-40



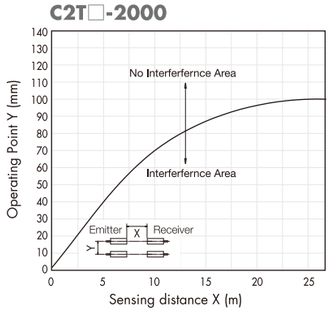
C2D□-80



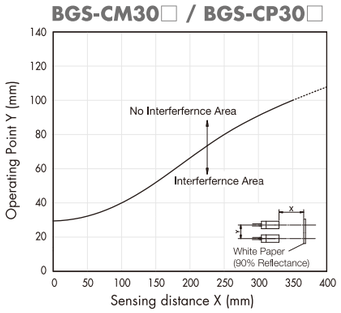
C2R□-350 / C2R□-F400 common



C2T□-2000

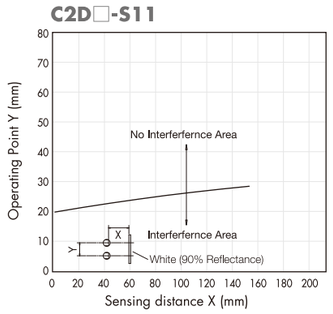


BGS-CM30□ / BGS-CP30□

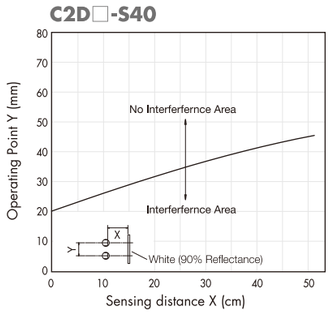


Angle (90 degree)

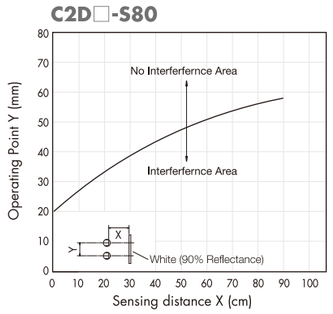
C2D□-S11



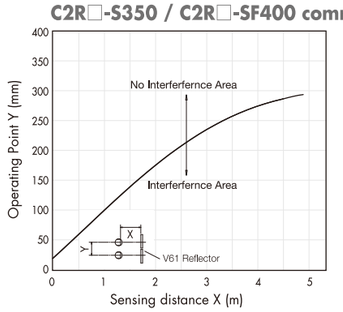
C2D□-S40



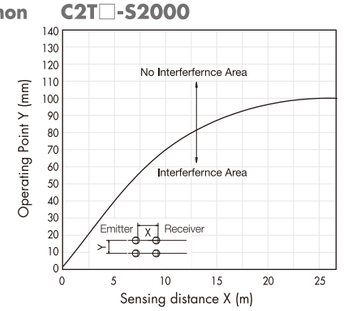
C2D□-S80



C2R□-S350 / C2R□-SF400 common



C2T□-S2000

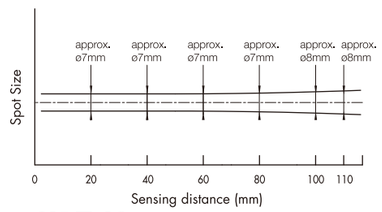


Spot size

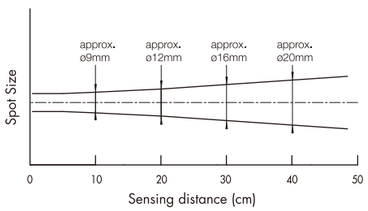
*common between plastic / metal housing

Standard Types

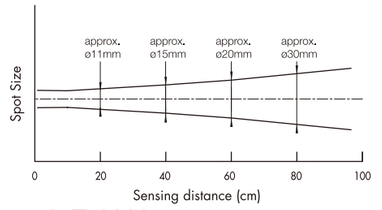
C2D□-11



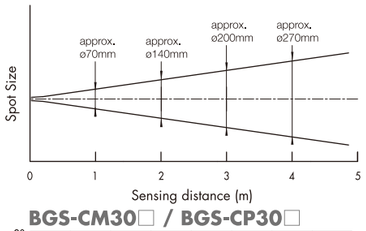
C2D□-40



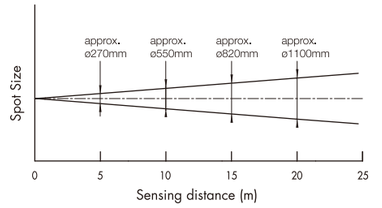
C2D□-80



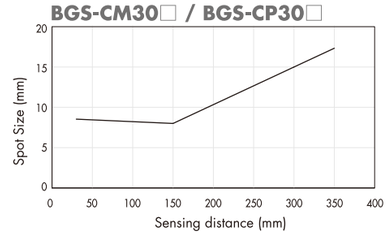
C2R□-350



C2T□-2000

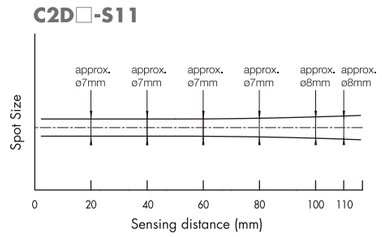


BGS-CM30□ / BGS-CP30□

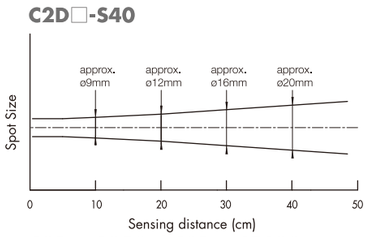


Angle (90 degree)

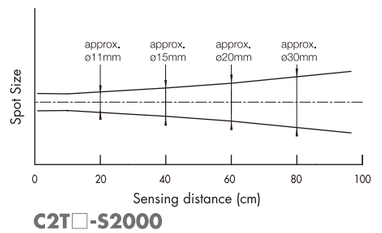
C2D□-S11



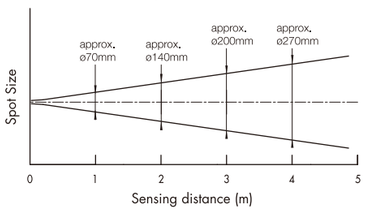
C2D□-S40



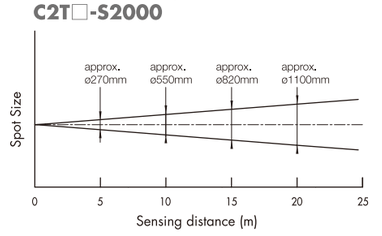
C2D□-S80



C2R□-S350 / C2R□-SF400 common



C2T□-S2000

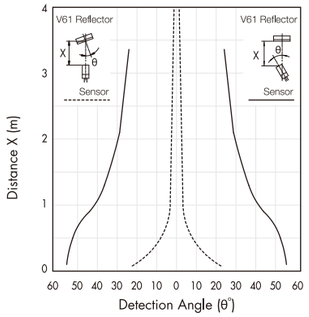


Angular deviation

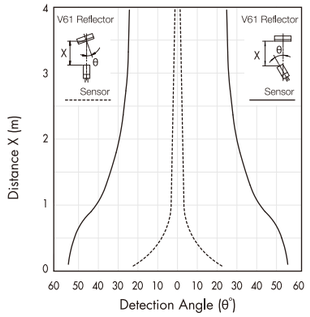
*common between plastic / metal housing

Standard Types

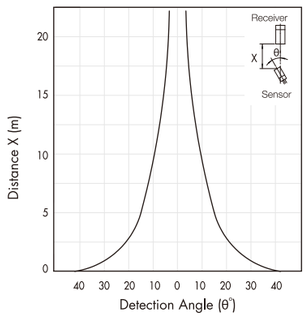
C2R□-350



C2R□-F400

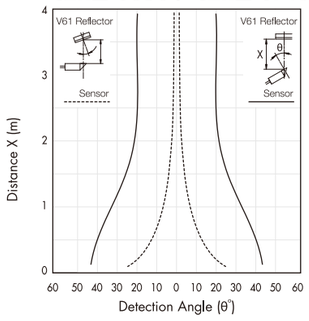


C2T□-2000

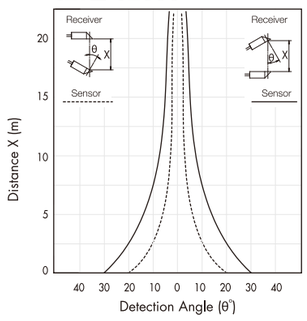


Angle (90 degree)

C2R□-S350 / C2R□-SF400 common



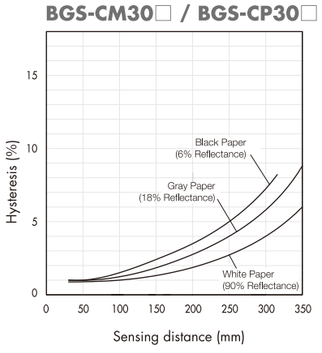
C2T□-S2000



BGS Hysteresis

*common among all the BGS types

BGS-CM30□ / BGS-CP30□

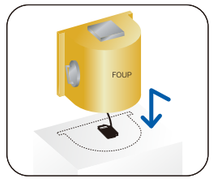


Photoelectric Sensor

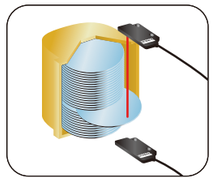
E series

- Super Side-sense Type projects the beam from the 5mm (0.19 inch) of wide edge of the sensor.
- M8 pig-tail connector types are available for all models.
- Tough mechanics. 100G Shock Resistance and IP67 Water tightness.
- Easily visible indicator LED can be seen even from the back.

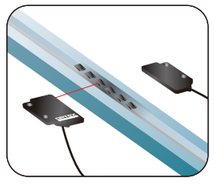
Applications



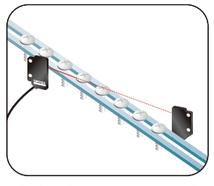
Detecting presence of FOUP



Detection of wafer extending from cassette



Detecting parts presence from parts feeder



Detecting screws at output of feeder

2 type select

M8 pig-Tail connector for easy maintenance.

M8 Pig-Tail

IP67 rating

RoHS compliant

Operating LED visible in the back

It's convenient. Verifying the operation of the sensor is easy.

Front view

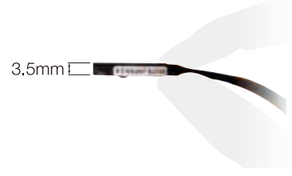
Back view

Universal mounting holes.

Flexible mounting for easy installation.

3.5mm thin dimensions (Flat type)

Leading edge of sensing functions are designed in this thin size. Ideal for space saving.
(Side sense type : 5mm)



Super Side-Sense type

Unique Side-Sensing Type available in Duffuse,Convergent and Thru-Beam.
M8 Pigtail models in both 3 and 4 pin types.

EL-S series
Convergent Type

15mm (0.6 inch) sensing distance.
Light-On/Dark-On models available.
+/-0.1mm (0.004 inch) repeat accuracy.
2mm (0.07 inch) project spot diameter at 15mm distance.
0.5 msec. response speed.

ED-S series
Diffuse Reflective Type

30mm sensing distance.
Light-On/Dark-On models available.
+/-0.05mm (0.002 inch) repeat accuracy.
30mm sensing distance with 10% Hysteresis.

ET-S series
Thru-Beam Type

500mm (19.7 inch) sensing distance.
Light-On/Dark-On models available.
+/-0.1mm (0.004 inch) repeat accuracy.
0.25 msec. response speed.

Flat type - Front Sense

Thin and flat design for space saving. Three different models of Convergent models.

EL - series
Convergent Type

3 different sensing distance are available.
30mm (1.18 inch),15mm (0.6 inch), and 8mm (0.31 inch) for close installation.
Compact housing is ideal for space saving.

ED - series
Diffuse Reflective Type

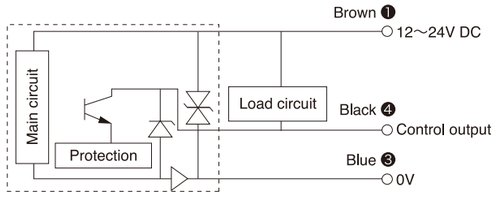
Standard diffuse reflective type with 100mm (3.94 inch) sensing distance.

ET - series
Thru-Beam Type

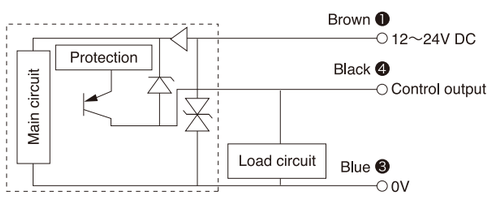
0.5msec responce speed and sharp optical system designed in
12 × 20 × 3.5 mm dimensions.

Circuit diagram

NPN output



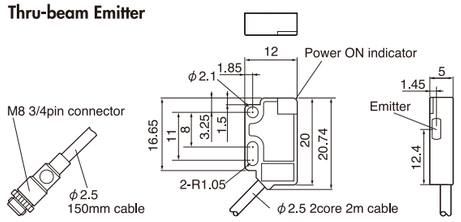
PNP output



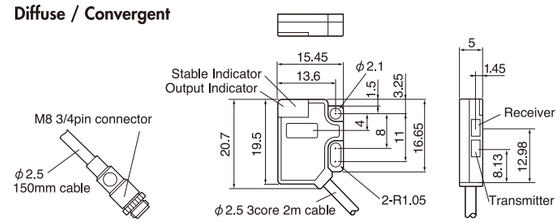
Dimensions

Super side - Sensing type

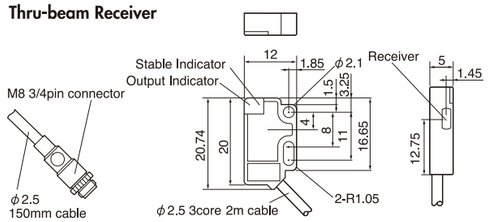
Thru-beam Emitter



Diffuse / Convergent



Thru-beam Receiver

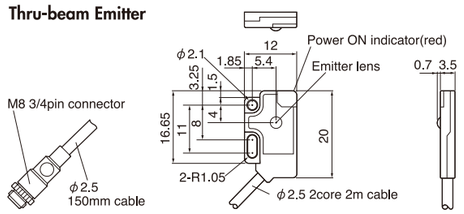


<3 Pin configuration>
① DC12~24V
② Control Output
③ 0V

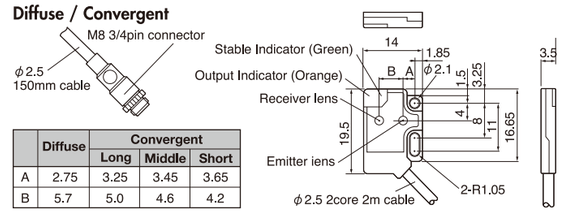
<4 Pin configuration>
① DC12~24V
② –
③ 0V
④ Control Output

Flat type - Front Sensing

Thru-beam Emitter

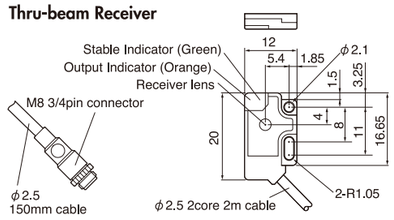


Diffuse / Convergent



	Diffuse	Convergent		
		Long	Middle	Short
A	2.75	3.25	3.45	3.65
B	5.7	5.0	4.6	4.2

Thru-beam Receiver



<3 Pin configuration>
① DC12~24V
② Control Output
③ 0V

<4 Pin configuration>
① DC12~24V
② –
③ 0V
④ Control Output

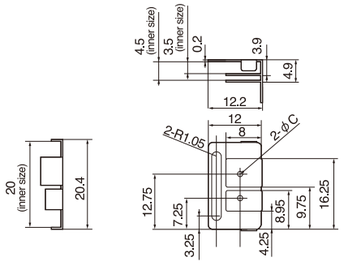
Options

Slit mask

BL-W2F-1(=ϕ1mm)
BL-W2F-1.5(=ϕ1.5mm)

	BL-W2F-1	BL-W2F-1.5
C	1	1.5
D	1	1.5

Material:SUS304 t=0.2



(Unit : mm)

Specifications

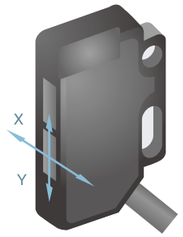
Super Side - Sensing type

Model			Diffuse 30mm	Convergent 15mm	Thru-beam 500mm
NPN type	Light ON	2m cable	ED-S30NL	EL-S15NL	ET-S500NL
		M8 pigtail - 3pin	ED-S30NL3	EL-S15NL3	ET-S500NL3
		M8 pigtail - 4pin	ED-S30NL4	EL-S15NL4	ET-S500NL4
	Dark ON	2m cable	ED-S30ND	EL-S15ND	ET-S500ND
		M8 pigtail - 3pin	ED-S30ND3	EL-S15ND3	ET-S500ND3
		M8 pigtail - 4pin	ED-S30ND4	EL-S15ND4	ET-S500ND4
PNP type	Light ON	2m cable	ED-S30PL	EL-S15PL	ET-S500PL
		M8 pigtail - 3pin	ED-S30PL3	EL-S15PL3	ET-S500PL3
		M8 pigtail - 4pin	ED-S30PL4	EL-S15PL4	ET-S500PL4
	Dark ON	2m cable	ED-S30PD	EL-S15PD	ET-S500PD
		M8 pigtail - 3pin	ED-S30PD3	EL-S15PD3	ET-S500PD3
		M8 pigtail - 4pin	ED-S30PD4	EL-S15PD4	ET-S500PD4
Supply voltage			DC 12 to 24V ±10% Inc. 10% ripple		
Power consumption			20mA Max		30mA Max
Sensing distance			30mm	2 - 15mm	500mm
Spot size			ϕ3mm @ 30mm	ϕ2mm @ 15mm	ϕ60mm @ 500mm
Objects			Not restricted		opaque object
Repeat accuracy			+/-0.05mm Max	+/-0.1mm Max	
Response time			0.25msec(ET), 0.5msec(ED,EL)		
Light souce			Red LED		
Hysteresis			10%		—
Control output			NPN or PNP Open collector, 1.8V -50mA 50mA/DC24V Max		
Environmental illuminance		Sunlight	10,000 lx Max		
		Incandescent lamp	3,000 lx Max		
Operating temp / humidity			–25 up to 55 °C / 35 up to 85%		
Storage conditions			–40 up to 70 °C / 35 up to 95%		
Noise resistance			EN60947-5-2:1998 (Immunity) EN60947-5-2:1998 (radiation)		
Vibration resistance			10 to 55Hz, 1.5mm, X-Y-Z each for 2 hours		
Shock resistance			1000m/S², X-Y-Z each for 3 times		
Protection category			IP67		
Warm-up time			100ms		
LED Indicator			Green (stable), Orenge (output), Red (Power of emitter : ET type)		
Connector and cable			2m cable, ϕ2.5mm 3 cores (2 cores for emitter) / M8 Pigtail 150 mm		
Circuit protection			Over Current, Reverse Polarity, Short Circuit		
Material			PC		
Conformity			CE		

Flat type - Front Sensing

Model			Diffuse 100mm	Convergent 8/15/30mm			Thru-beam 500mm
NPN type	Light ON	2m cable	ED-100NL	EL-30NL	EL-15NL	EL-08NL	ET-500NL
		M8 pigtail - 3pin	ED-100NL3	EL-30NL3	EL-15NL3	EL-08NL3	ET-500NL3
		M8 pigtail - 4pin	ED-100NL4	EL-30NL4	EL-15NL4	EL-08NL4	ET-500NL4
	Dark ON	2m cable	ED-100ND	EL-30ND	EL-15ND	EL-08ND	ET-500ND
		M8 pigtail - 3pin	ED-100ND3	EL-30ND3	EL-15ND3	EL-08ND3	ET-500ND3
		M8 pigtail - 4pin	ED-100ND4	EL-30ND4	EL-15ND4	EL-08ND4	ET-500ND4
PNP type	Light ON	2m cable	ED-100PL	EL-30PL	EL-15PL	EL-08PL	ET-500PL
		M8 pigtail - 3pin	ED-100PL3	EL-30PL3	EL-15PL3	EL-08PL3	ET-500PL3
		M8 pigtail - 4pin	ED-100PL4	EL-30PL4	EL-15PL4	EL-08PL4	ET-500PL4
	Dark ON	2m cable	ED-100PD	EL-30PD	EL-15PD	EL-08PD	ET-500PD
		M8 pigtail - 3pin	ED-100PD3	EL-30PD3	EL-15PD3	EL-08PD3	ET-500PD3
		M8 pigtail - 4pin	ED-100PD4	EL-30PD4	EL-15PD4	EL-08PD4	ET-500PD4
Supply voltage			DC 12 to 24V ±10% Inc. 10% ripple				
Power consumption			20mA Max				30mA Max
Sensing distance			100mm	5 - 30mm	2 - 15mm	3 - 8mm	500mm
Spot size			ϕ60mm @ 100mm	ϕ20mm @ 30mm	ϕ10mm @ 15mm	ϕ10mm @ 8mm	ϕ140mm @ 500mm
Objects			Not restricted				opaque object
Response time			0.5msec Max				
Hysteresis			White Paper : 10% (EL-08 and EL-15),15%(EL-30 and EL-100)				—
Control output			NPN or PNP Open collector, 50mA Max / 24V DC				
Environmental illuminance			Sun light:10,000 lux Max,Incandescent lamp:3,000 lux Max				—
Operating temp / humidity			–25 up to 55 °C / 35 up to 85%				
Storage temp / humidity			–40 up to 70 °C / 35 up to 95%				
Noise resistance			EN60947-5-2:1998 (Immunity) EN60947-5-2:1998 (radiation)				
Vibration resistance			10 to 55Hz, 1.5mm, X-Y-Z each for 2 hours				
Shock resistance			1000m/S², X-Y-Z each for 3 times				
Protection category			IP67				
Warm-up time			15msec				
LED Indicator			Green (stable), Orenge (output), Red (Power of emitter : ET type)				
Operating mode			Light ON / Dark ON selectable				
Connector and cable			2m cable, ϕ2.5mm 3 conductors (2 conductors for emitter) / M8 Pigtail 150 mm				
Circuit protection			Over Current, Reverse Polarity, Short Circuit				
Material			PC				
Conformity			CE				

Reference (typical)

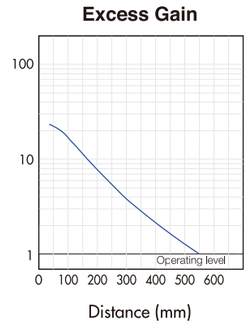


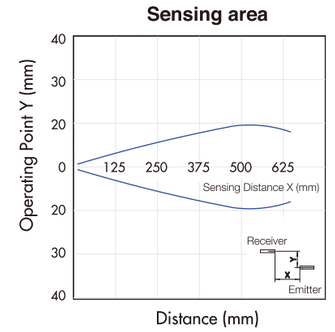
Repeat Accuracy

ET-S500		ED-S30		EL-S15	
X	Y	X	Y	X	Y
0.1	0.1	0.05	0.05	0.05	0.05

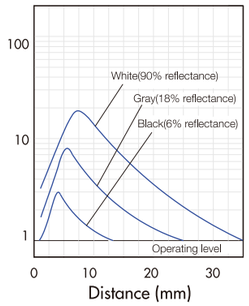
(Unit : mm)

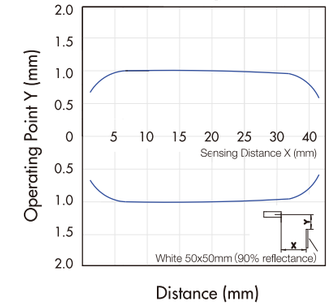
ET-S500



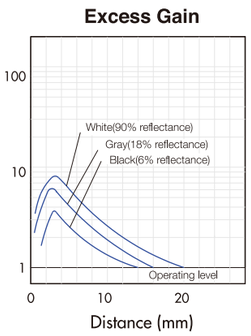


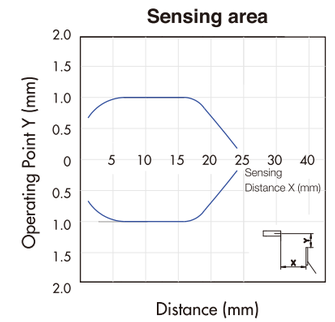
ED-S30



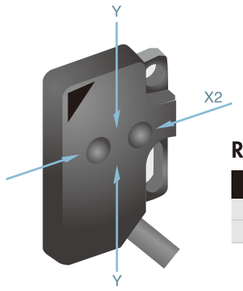


EL-S15





Reference (typical)

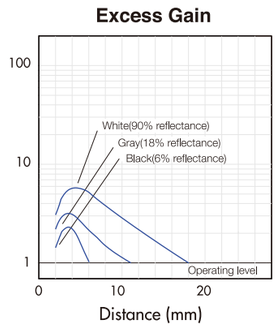


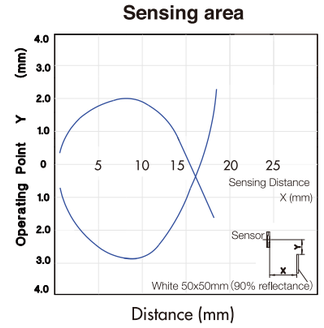
Repeat Accuracy

EL-30			EL-15			EL-08		
X1	X2	Y	X1	X2	Y	X1	X2	Y
0.8	0.8	0.8	0.3	0.3	0.3	0.1	0.1	0.1

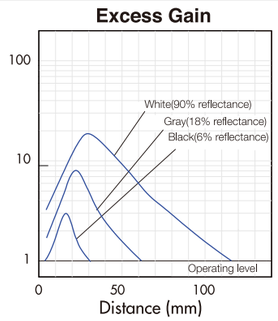
(Unit : mm)

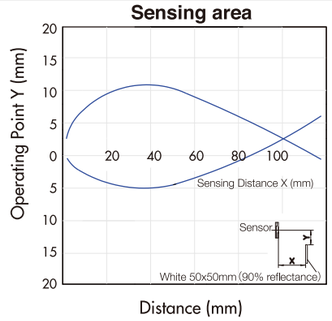
EL-15



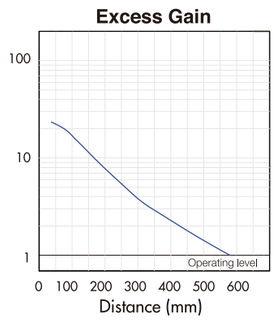


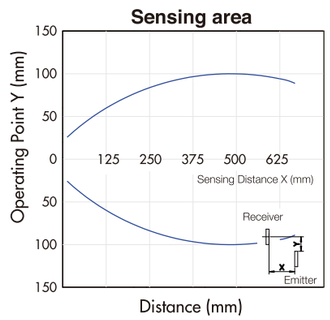
ED-100





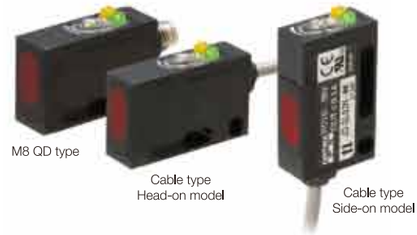
ET-500





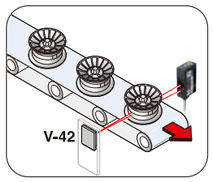
Photoelectric Sensor

J series

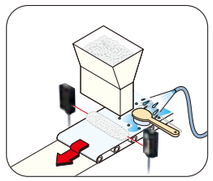


- Epoxy filled sensor housing provides IP67G rating for complete protection against water.
- 100G of shock resistance.
- M8 QD types are available for over all types.

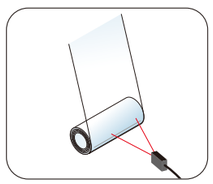
Applications



Counting wheels (JR-S300)



Monitoring cookie paste (JT-S1000)

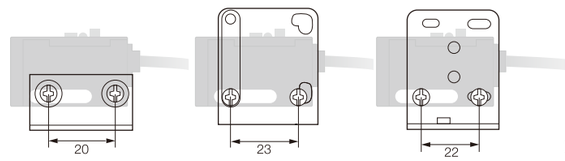


Roll of transparent film (JD-HW08)

Epoxy filled housing provides complete protection against water.

Slotted mounting holes for added flexibility. (Applicable for both M3 and M4)

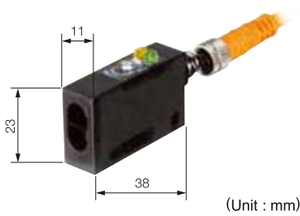
The slotted mounting hole (25.4 mm pitch) allows the sensor to be used with various types of mounting brackets.



(Unit : mm)

M8 QD for easy maintenance

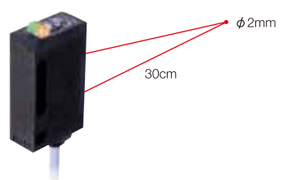
The M8 QD connector types are small enough to be installed in areas where mounting space is limited.



(Unit : mm)

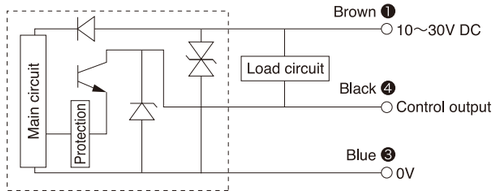
Visible red spot

Visible red LED spot for easy alignment of the sensor. The projected spot is approx. 2 mm dia. at 30 cm distance from the sensor.

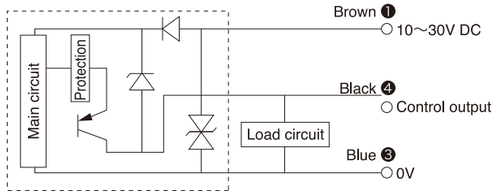


Circuit diagram

NPN output

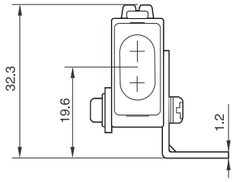


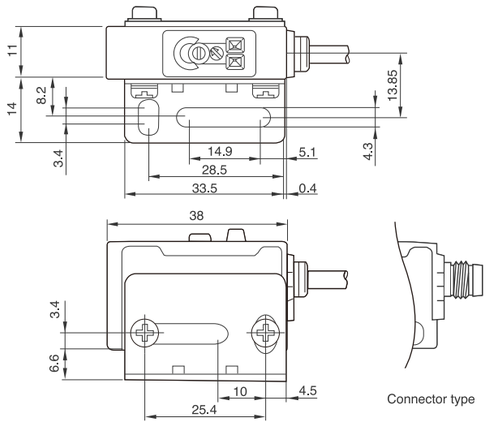
PNP output



Dimensions

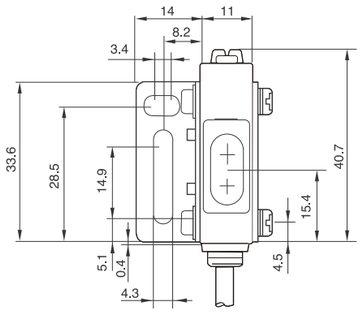
Head ON type

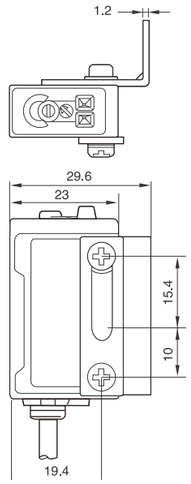




Connector type

Side ON type



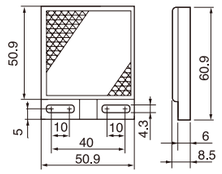


Connector type

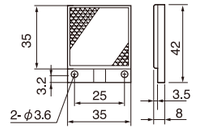
<4 Pin configuration>
① DC10~30V
② –
③ 0V
④ Control Output

(Unit : mm)

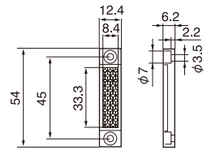
Standard reflector V-61



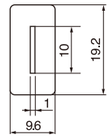
Small reflector V-42



Tiny reflector P45A



SJ-01 Slit mask for JT types



Specifications

Model		Thru-beam	Retro-Reflection	Diffuse Reflection	Limited range (convergent)	Wide angle (divergent)
Cable type	NPN	JT-H(S)1000N(R)	JR-H(S)300N	JD-H(S)R80N	JD-H(S)L03N	JD-H(S)W08N
	PNP	JT-H(S)1000P(R)	JR-H(S)300P	JD-H(S)R80P	JD-H(S)L03P	JD-H(S)W08P
Connector type	NPN	JT-H(S)1000CN(R)	JR-H(S)300CN	JD-H(S)R80CN	JD-H(S)L03CN	JD-H(S)W08CN
	PNP	JT-H(S)1000CP(R)	JR-H(S)300CP	JD-H(S)R80CP	JD-H(S)L03CP	JD-H(S)W08CP
Sensing distance		10m	3m	80cm	2-5cm	8cm
Response time		0.5msec Max				
Operating mode		Light on / Dark on selectable				
Hysteresis		NIL		20% Max		
Light source		Red LED / Infrared	Red LED			
Control output		NPN or PNP Open collector, 100mA Max / 30V DC				
Supply voltage		DC 10 to 30V including 10% of ripple				
Conformity		JIS / C4525, CE, UL				
Power consumption		Emitter : 20mA, Receiver 15mA	20mA Max			
Sensitivity adjustment		2-turn Potentiometer				
Indicator		2 indicator, Output (Orange), Stable (Green)				
Protection category		IEC 144 IP67, JEM IP67g				
Shock resistance		100G (1,000m/S^2), X-Y-Z axis 3 times				
Environmental illuminance		Sunlight : 10,000 lux Max, Incandescent lamp : 3,000 lux Max.				
Material		PBT (Case), PC (Lens)				

Options

Standard reflector V-61

Small reflector V-42

Tiny reflector P45A

JCN-S：M8 Straight type

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

JCN-L：M8 L-shape type

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

Protective mounting brackets (For Head-on types)

LJ-H01：Protector

LJ-H02：Protector

Protective mounting brackets (For Side-on types)

LJ-S01：Protector

LJ-S02：Protector

SJ-01 Slit mask for JT types

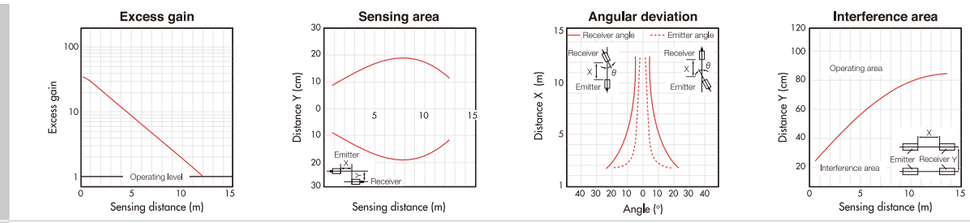
Slit size	Installation	Minimum	Maximum distance
1×10mm	Both of emitter / receiver	0.6mm	1m

Sensor stand
PLN-1

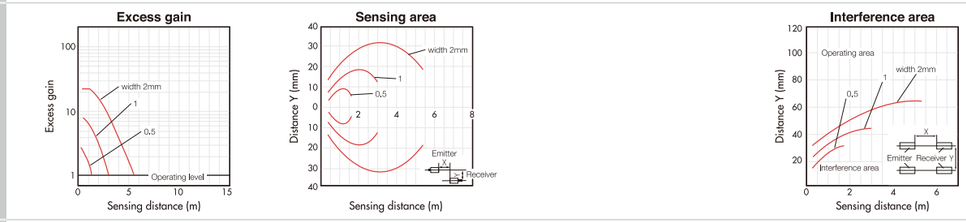
Fixture of Reflector
PLN-1M

Reference (typical)

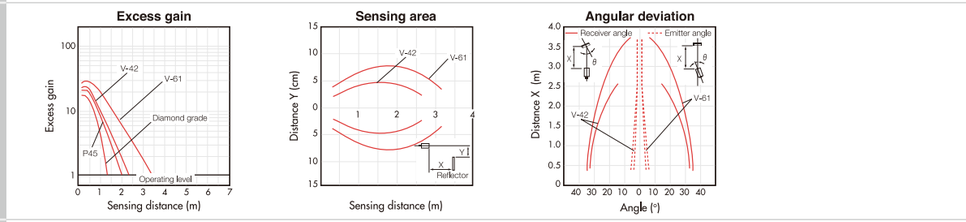
JT-H1000N
JT-S1000N



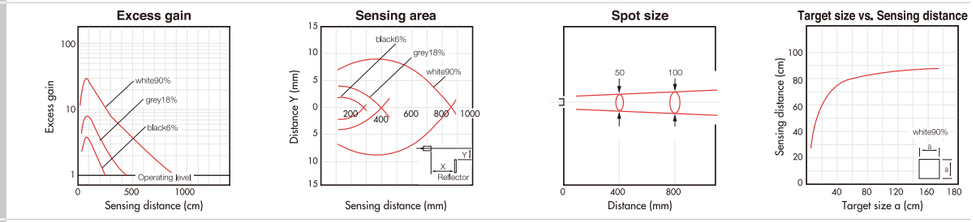
JT-H1000N
JT-S1000N
& SLIT



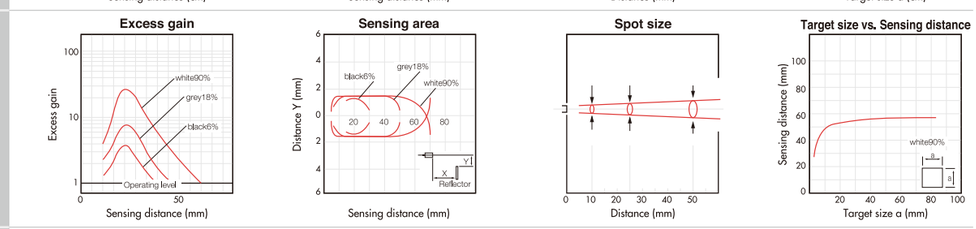
JR-H300N
JR-S300N



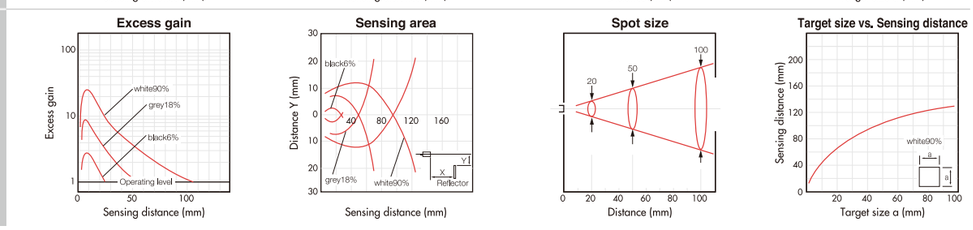
JD-HR80N
JD-SR80N



JD-HL03N
JD-SL03N



JD-HW08N
JD-SW08N



Photoelectric Sensor

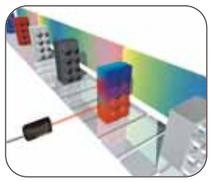
J2 series

head-on type

side-on type

- Epoxy filled sensor housing provides IP67 rating for complete protection against water and 100G of shock resistance.
- Narrow view optics project a 1.5 mm spot (Diffuse Reflective type J2D).
- 1 meter sensing distance - Diffuse Reflective type (J2D).

Applications



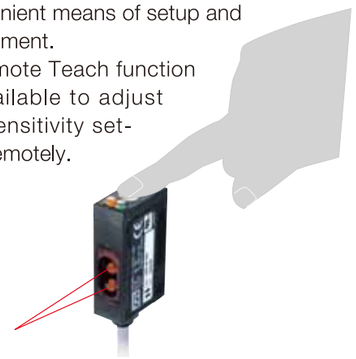
BGS function for colorful object detection (BGS type)

Completely waterproof

Fully epoxy injected inside the body. (IP67)
Protection category 100G means tough and rigid mechanics.

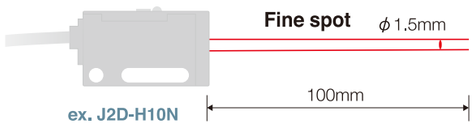
Single Button Teaching

Built-in microcomputer offers a convenient means of setup and adjustment.
A Remote Teach function is available to adjust the sensitivity setting remotely.



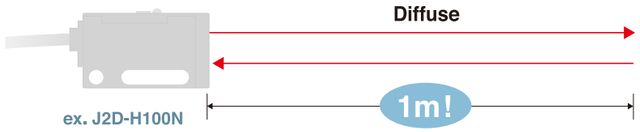
Narrow View Diffuse.

The Narrow view diffuse model projects a 1.5 mm diameter spot at 100 mm distance. The sharp angle of view is ideal for detecting a target through a small opening.



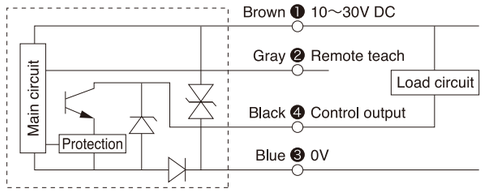
1 meter Diffuse.

1 meter sensing distance in diffuse reflection mode.

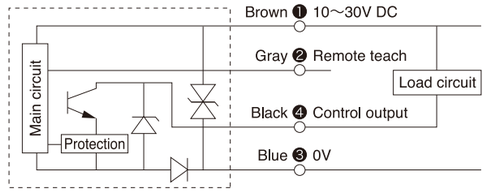


Circuit diagram

NPN output



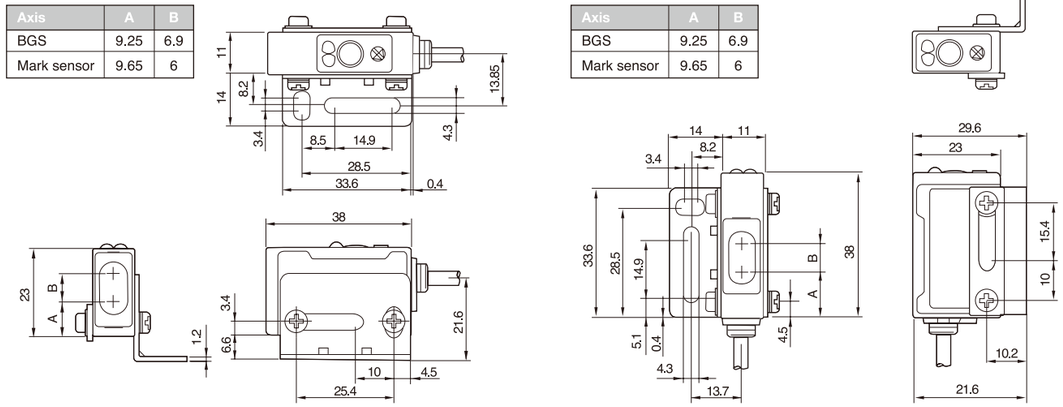
PNP output



Dimensions

Head ON type

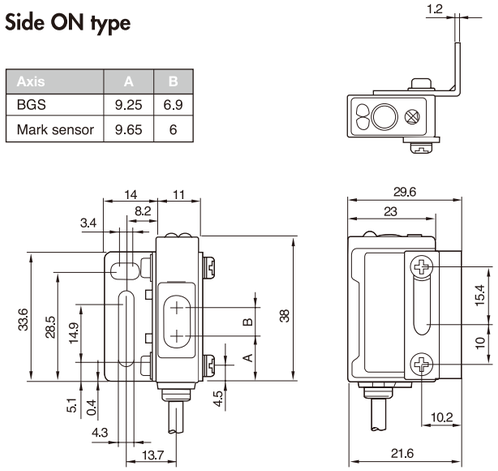
Axis	A	B
BGS	9.25	6.9
Mark sensor	9.65	6



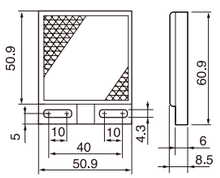
<4 Pin configuration>
① DC10~30V
② –
③ 0V
④ Control Output

Side ON type

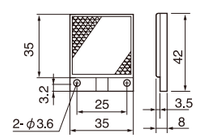
Axis	A	B
BGS	9.25	6.9
Mark sensor	9.65	6



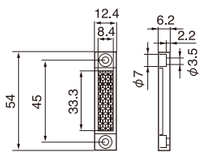
Standard reflector V-61



Small reflector V-42



Tiny reflector P45A



(Unit : mm)

Specifications

Model		Narrow View	Diffuse Reflective (IR)	Diffuse Reflective (Red)	BGS
Cable type	NPN	J2D-H(S)10N	J2D-H(S)100N	J2D-H(S)70N	BGS-H(S)15N
	PNP	J2D-H(S)10P	J2D-H(S)100P	J2D-H(S)70P	BGS-H(S)15P
Connector type	NPN	J2D-H(S)10CN	J2D-H(S)100CN	J2D-H(S)70CN	BGS-H(S)15CN
	PNP	J2D-H(S)10CP	J2D-H(S)100CP	J2D-H(S)70CP	BGS-H(S)15CP
(Remark)		"H = Head-on, S = Side-on			
Sensing distance		100mm	1000mm	700mm	50-150mm
Power consumption		10mA Max			45mA Max
Response time		0.5m sec			2.5 msec Max
Hysteresis		15%			8% @ 100mm
Spot size		ϕ1.5mm@100mm	ϕ85mm@1000mm	ϕ50mm@600mm	ϕ10mm@150mm
Light source		Red	Infrared	Red	
Supply voltage		DC 10 to 30V including 10% of ripple			
Control output		NPN or PNP Open collector, 100mA Max / 30V DC			
Sensitivity adjustment		Teach-in (Available Remote Teach-in)			
Shock resistance		100G (1,000m/S^2), X-Y-Z axis 3 times			
Remarks		Connector is M8, 3 and 4 pin connectors are available			
Operating mode		Light on / Dark on selectable			
Operating temp		–25 up to 55 °C			
Operating humidity		35 up to 95% RH			
Storage temp / humidity		–40 up to 70 °C, 35 - 95% RH			
Environmental illuminance		Sunlight : 10,000 lux Max, Incandescent lamp : 3,000 lux Max.			
Insulation resistance		Min. 20 M Ohm / DC500V			
Conformity		JIS, CE, CRU			
(JIS C4525)		1 sec, 300V			
Feilen test		Level 3			
VDE protection		Class 3			
Vibration resistance		10 to 55 hz amplitude 1.5mm, X-Y-Z for 2 hours			
Protection category		IP67			
Material		Case : PBT, Lens : PMMA			

Options

Standard reflector V-61

Small reflector V-42

Tiny reflector P45A

JCN-S : M8 Straight type

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

JCN-L : M8 L-shape type

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

Sensor stand
PLN-1

Fixture of Reflector
PLN-1M

Protective mounting brackets (For Head-on types)

LJ-H01

LJ-H02

Protective mounting brackets (For Side-on types)

LJ-S01

LJ-S02

Photoelectric Sensor

J3 series

- J3M Mark sensor with Pushbutton Teach.
- Narrow view optics project a 3.0 mm spot (Retro-reflective type J3R-100).
- 1.5 mm projected spot for BGS types.
- Epoxy filled sensor housing provides protection against vibration.

IP67

In addition to vibration resistance, the epoxy filled housing results in an IP67 rating.

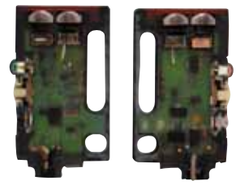
Fast Response 200 micro sec, 10±2mm sensing distance (Mark sensor J3M type)

A latest Green LED with physical composition of GlanN2.
It's best for mark sensing.

Sensing distance 10mm

Completely waterproof

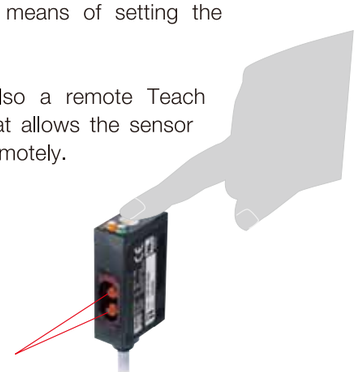
An IP67 rating is guaranteed by filling the sensor body with epoxy.
The 100G shock resistance rating protects the sensor against mechanical vibration.



One-push Teaching.

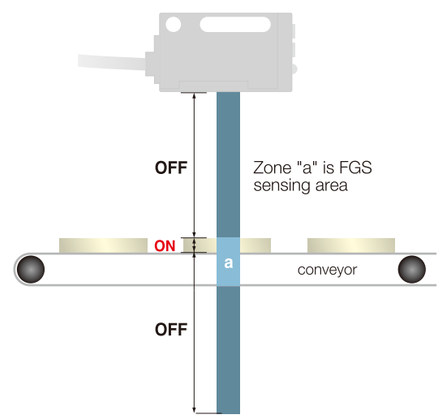
The built-in microcomputer provides a convenient means of setting the sensor.

There is also a remote Teach function that allows the sensor to be set remotely.

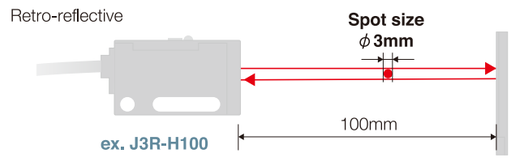


BGS-S/H15 : Built-in FGS function

The BGS-S15 and BGS-H15 sensors are able to operate as FGS (foreground suppression) sensors. The FGS function senses the surface of the conveyor and uses this as a reflector, the sensor will detect thin and/or flat objects positioned on the conveyor.
A standard diffuse reflective sensor could be used in this application but adjusting the sensitivity is sometimes difficult, the FGS function is easily adjusted and will operate in a manner similar to a retro-reflective sensor without the reflector.

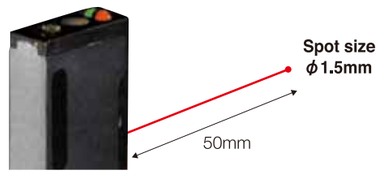


Ideal for detection of small objects



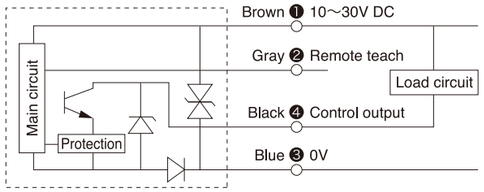
ϕ1.5mm of small spot size (BGS-3JH05)

Small spot in a BGS sensing system.

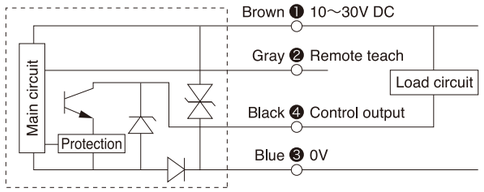


Circuit diagram

NPN output



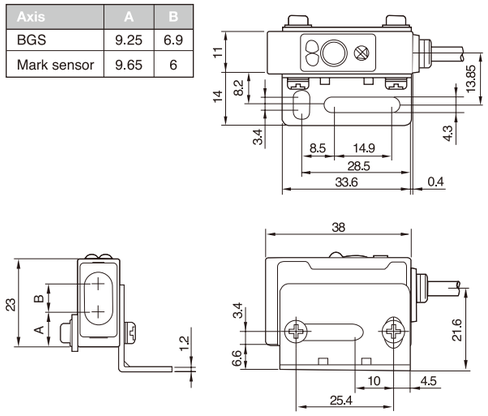
PNP output



Dimensions

Head ON type

Axis	A	B
BGS	9.25	6.9
Mark sensor	9.65	6

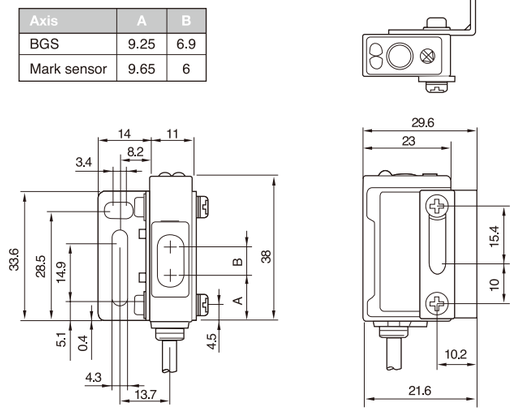


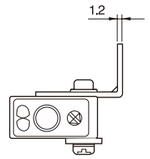
<4 Pin configuration>

① DC10~30V
② –
③ 0V
④ Control Output

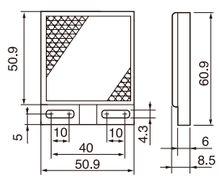
Side ON type

Axis	A	B
BGS	9.25	6.9
Mark sensor	9.65	6

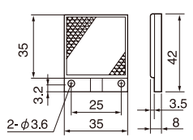




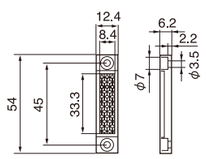
Standard reflector V-61



Small reflector V-42



Tiny reflector P45A



Specifications

Model		Mark Sensor	Retro-reflective Narrow View	BGS
Cable type	NPN	J3M-GH(S)01N	J3R-H(S)100N	BGS-3JH(S)05N
	PNP	J3M-GH(S)01P	J3R-H(S)100P	BGS-3JH(S)05P
Connector type	NPN	J3M-GH(S)01CN	J3R-H(S)100CN	BGS-3JH(S)05CN
	PNP	J3M-GH(S)01CP	J3R-H(S)100CP	BGS-3JH(S)05CP
(Remark)		*H = Head-on, S = Side-on		
Sensing distance		10 +/- 2m	0.05 - 1m	15 - 50mm/18%
Power consumption		40mA Max		
Response time		0.2m sec		0.7 msec
Hysteresis		N/A		5%
Min detectable object		Appr 2 x 5mm @ 10mm	1mm @ 100mm	0.5mm round@150mm
Light source		Green	Red LED with special focusing lens	Red
Off delay		40 msec fixed		
Supply voltage		DC 10 to 30V including 10% of ripple		
Control output		NPN or PNP Open collector, 100mA Max / 30V DC		
Sensitivity adjustment		Teach-in		
Remote teach-in		Available		
Shock resistance		100G (1,000m/S^2), X-Y-Z axis 3 times		
Remarks		Light on / Dark on selectable		
Operating temp		–25 up to 55 °C		
Operating humidity		35 up to 95% RH		
Storage conditions		–40 up to 70 °C, 35 - 95% RH		
Environmental illuminance		Sunlight : 10,000lux Max, Incandescent lamp : 3,000 lux Max.		
Insulation resistance		Min. 20 M Ohm / DC500V		
Conformity		JIS, CE, CRU		
(JIS C4525)		1μsec, 300V		
Feilen test		Level 3		
VDE protection		Class 3		
Vibration resistance		10 to 55 hz amplitude 1.5mm, X-Y-Z for 2 hours		
Protection category		IP67		
Material		Case : PBT, Lens : PMMA		

Options

Standard reflector V-61

Small reflector V-42

Tiny reflector P45A

JCN-S : M8 Straight type

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

JCN-L : M8 L-shape type

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

Protective mounting brackets (For Head-on types)

LJ-H01 : Protector

LJ-H02 : Protector

Protective mounting brackets (For Side-on types)

LJ-S01 : Protector

LJ-S02 : Protector

Sensor stand
PLN-1

Fixture of Reflector
PLN-1M

Photoelectric Sensor

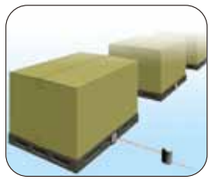
V series

- Universal voltage photoelectric sensor 12～240 VDC / 24～240 VAC. M12 QD types are available.
- Relay contact (AC/DC models) and Transistor output (DC models).
- Rugged duty sensor housing.
- BGS-V2000, long sensing distance (2m) with BGS operation.

Applications

Rubber / plastic industry

Transportation industry



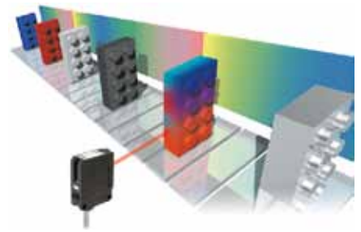
Material handling

High power light source

The strong LED light source assures stable sensing even in misty or dirty conditions.

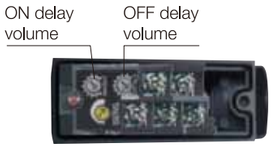
Long sensing BGS-V2000 (2m) BGS type

BGS-V2000 , 2m sensing BGS sensor.



Timer Function

Adjustable ON delay, OFF delay and ON+OFF delay time by individual delay trimmer.
From 0.1 to 10 sec.

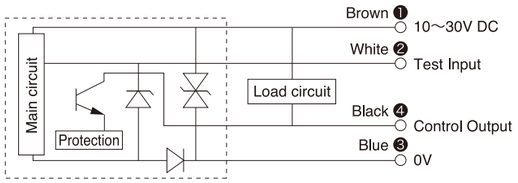


Applicable for use world-wide

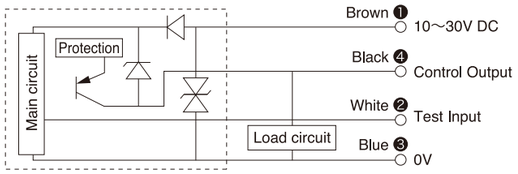
24 to 240V AC
12 to 240V DC.

Circuit diagram

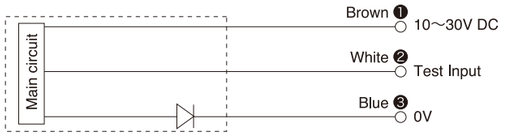
NPN output



PNP output

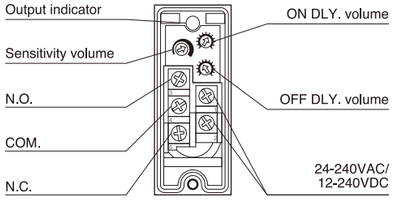


Emitter

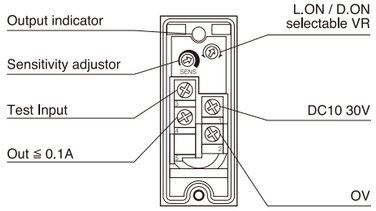


Connections

Relay type



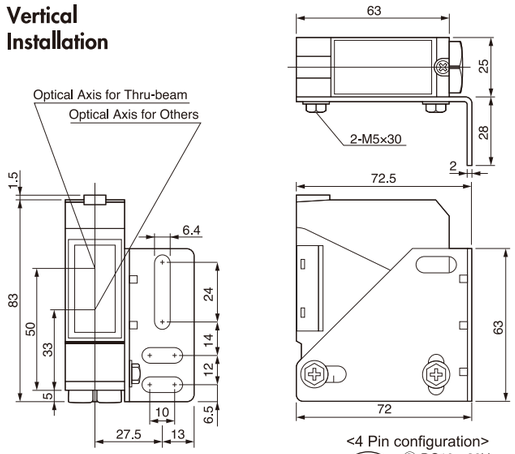
NPN / PNP type



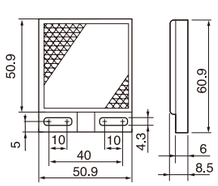
Dimensions

Horizontal Installation

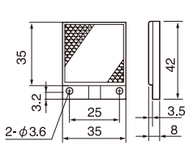
Vertical Installation



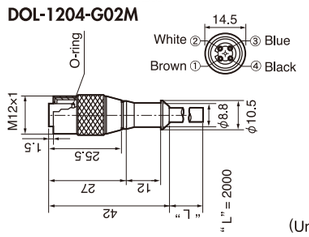
Standard reflector V-61



Small reflector V-42



M12 connector cable DOL-1204-G02M



(Unit : mm)

Specifications

Model		Thru-beam	Retro-Reflection	Diffused-Reflection Red LED	Diffused-Reflection IR LED	BGS type
Relay output type		VT-4000	VR-1000	VD-130	VD-300	BGS-V2000
	Timer	VT-4000T	VR-1000T	VD-130T	VD-300T	BGS-V2000T
Transistor output type	NPN/PNP	VT-3000N / 3000P	VR-800N / 800P	VD-100N / 100P	VD-250N / 250P	BGS-V2000N / 2000P
	Connector	VT-3000CN / 3000CP	VR-800CN / 800CP	VD-100CN / 100CP	VD-250CN / 250CP	BGS-V2000CN / 2000CP
Sensing distance	Relay type	40 meter	10 meter	1.3 meter	3 meter	0.5~2 meter
	Transistor type	30 meter	8 meter	1 meter	2.5 meter	0.5~2 meter
Response time	Relay type	20msec				
	Transistor type	1.5msec			5msec	
Operating mode		Relay type = Light On fixed, NPN / PNP type = Light On / Dark On switchover				
Hysteresis		NIL		20% Max		15% Max
Light source		Red			Infrared	
Control output		NO / NC AC240V / DC30V,3A				NO / NC AC240V / DC30V,3A
		NPN or PNP Open collector, 100mA Max / 30V DC				
Supply voltage		AC24-240V, DC12-240V +/–10% ripple				
		DC10-30V incl. 10% ripple				
Conformity		JIS / C4525, CE, UL				
Power consumption		8.5VA	5VA			
		35mA			5mA	
Cable connection		Terminal chamber, applicable cable ϕ6 to ϕ10				
Test input		Available in Transistor output types				
Operating temp		–25~+55°C				
Operating humidity		35~85% RH				
Sensitivity adjustment		Single turn trimmer				TEACH-IN
Protection		IEC 144, IP67				
Shock resistance		50G, XYZ 3-ways				
Materials		Glassfiber reinforced ABS(Case), PMMA(Lens)				ABS(Case), PC(Lens), PMMA(Cover)

Options

Standard reflector V-61

Small reflector V-42

Connector cable DOL-1204-G02M

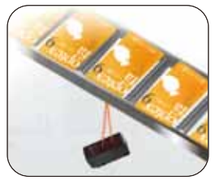
Photoelectric Sensor

V2 series

- BGS types with a rugged duty housing.
- Up to 100 cm sensing distance (BGS-2V100).
- The large lenses assure stable sensing.
- IP67, QD types are available.

Applications

Gate control (V2T-7000)



Magazines on roller conveyor (BGS-2V50)

Parking control (V2T-7000)

Tire counting (V2R-1200)

A large projecting and receiving lens results in a strong projected beam. Ideal for use in tough conditions like a foggy atmosphere.

Only 1cm of dead area (Retro-reflective types)

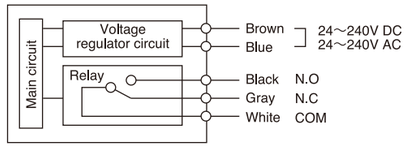
V2R-1200

Connector can be rotated for added flexibility when mounting. (DC Power type)

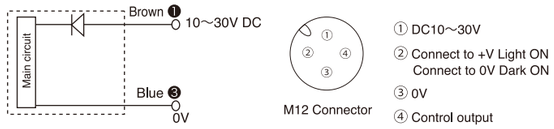
The connector rotates 90 degrees for added flexibility when mounting.
IP67 is maintained even with the connector.

Circuit diagram

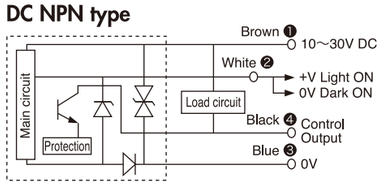
AC/DC type



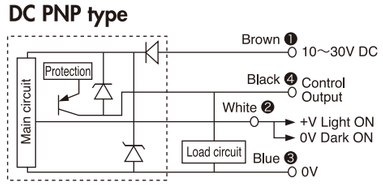
DC Emitter



DC NPN type

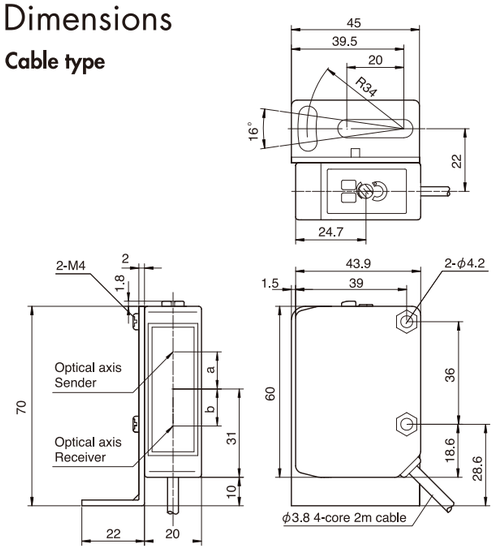


DC PNP type



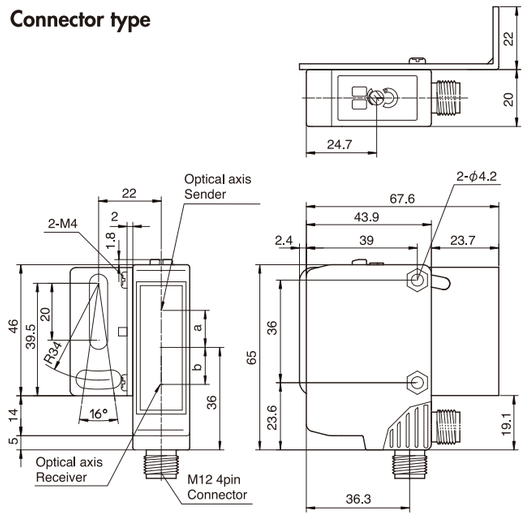
Dimensions

Cable type



	BGS-2V	V2R-1200	V2T-7000
a	13	16.8	44
b	BGS Short 12.6 / mid 13 / long 13.6	19	-

Connector type



	BGS-2V	V2R-1200	V2T-7000
a	13	16.8	49
b	BGS Short 12.6 / mid 13 / long 13.6	24	-

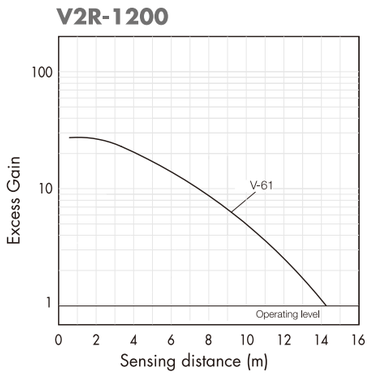
Specifications

Model	V2 series AC/DC type					V2 series DC type				
	Thru-beam	Retro-reflective (polarized filter)	BGS			Thru-beam	Retro-reflective (polarized filter)	BGS		
			Long range	Middle range	Short range			Long range	Middle range	Short range
Cable type	V2T-7000	V2R-1200	BGS-2V100	BGS-2V50	BGS-2V30	V2T-7000D(N,P)	V2R-1200D(N,P)	BGS-2V100(N,P)	BGS-2V50(N,P)	BGS-2V30(N,P)
Connector type	—	—	—	—	—	V2T-7000CD(N,P)	V2R-1200CD(N,P)	BGS-2V100C(N,P)	BGS-2V50C(N,P)	BGS2V30C(N,P)
Detecting distance	70m	0.01～12m*1	25～100cm	15～50cm	10～30cm	70m	0.01～12m*1	25～100cm	15～50cm	10～30cm
Light source	Red LED									
Supply voltage	DC24～240V±10% AC24～240V±10% 50/60Hz					DC10～30V Including ripple (P-P)10%				
Current consumption	3VA max.(class A) 2VA max. (class A)					35mA max.				
	4VA max.(class B) 2.5VA max.(class B)									
Response time	15ms max.					0.5ms max.		3ms max.		2ms max.
Hysteresis	—		20% Max	5% Max		—		15% max.		5% max.
Control output	Relay 1C DC30V 2A / AC250V 3A max.					NPN/PNP open collector DC30V 100mA max. (Residual voltage 1.8V max)				
Operation mode	Light ON					Light ON / Dark ON selectable by wiring				
Sensitivity adjustment	2 rotation volume									
Indicator	Output indicator (orange LED) / Stable indicator (green LED)									
Ambient temp./humidity	-25～55°C / 35～85%RH (No condensation of freezing)									
Storage temp./humidity	-40～70°C / 35～95%RH									
Environmental illuminance	Sun light:10000 lx max. Incandescent light:3000 lx max.									
Protection category/material	IP67 (IEC 144)/Case: ABS (Glass fiber include) Front cover : PC (PMMA for retro-ref.type)									

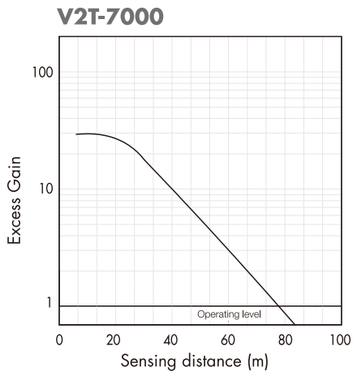
*1 **Reflector V-61**

Excess gain

V2R-1200

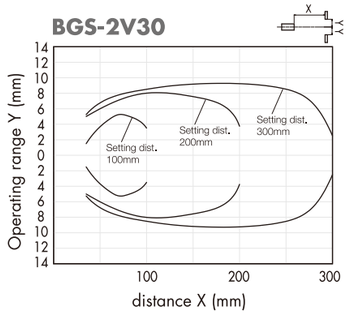


V2T-7000

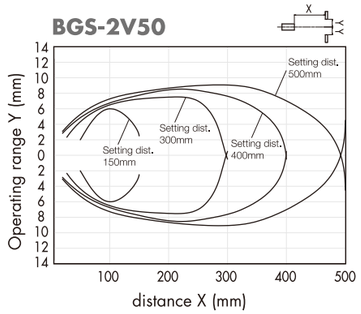


Sensing area

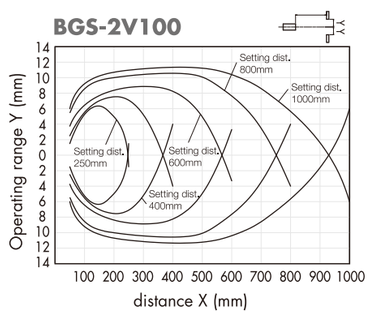
BGS-2V30



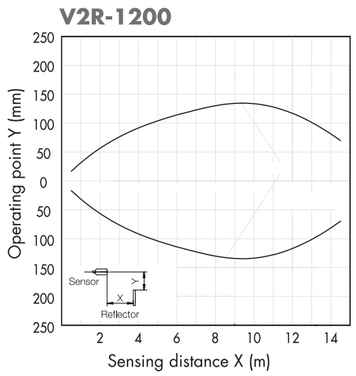
BGS-2V50



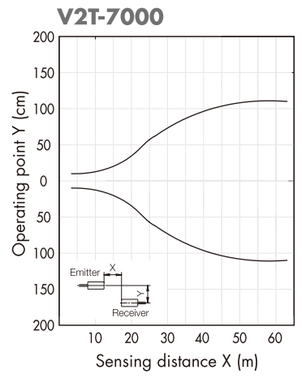
BGS-2V100



V2R-1200

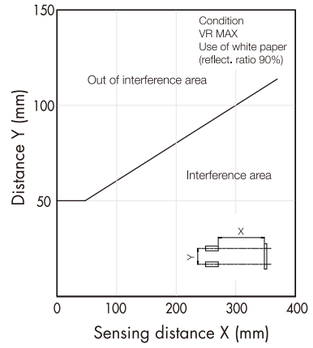


V2T-7000

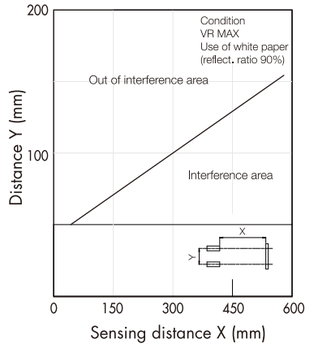


Interference area

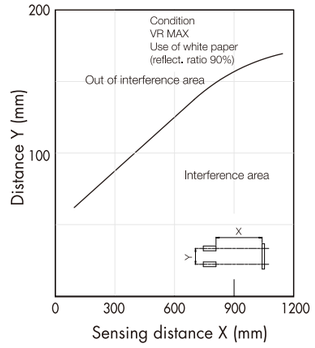
BGS-2V30



BGS-2V50

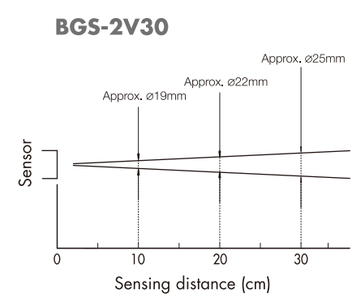


BGS-2V100

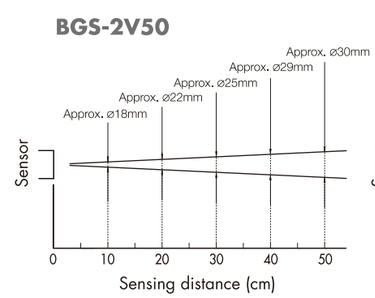


Spot size

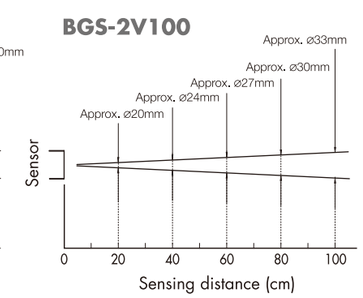
BGS-2V30



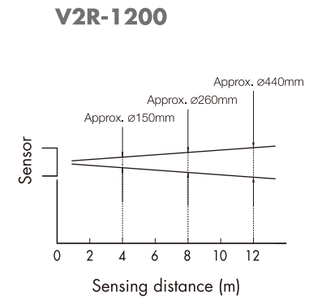
BGS-2V50



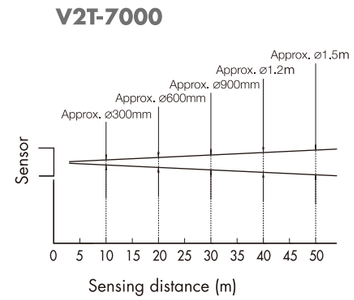
BGS-2V100



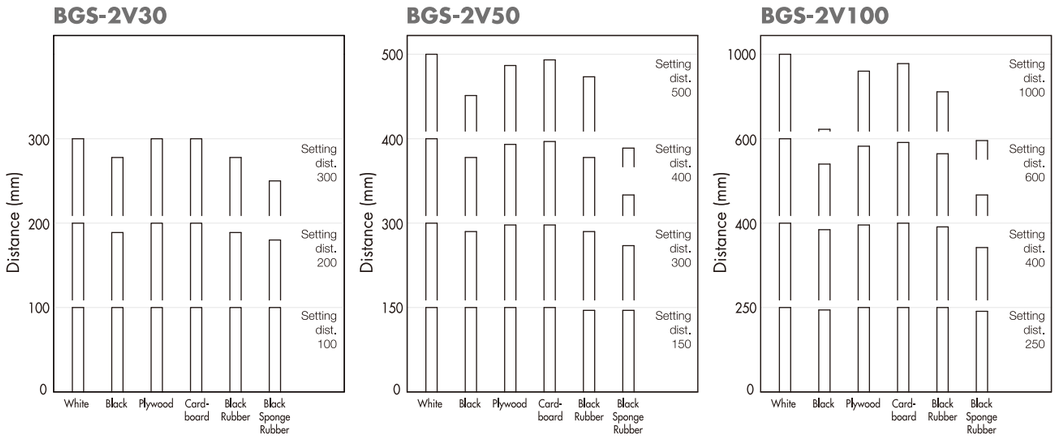
V2R-1200



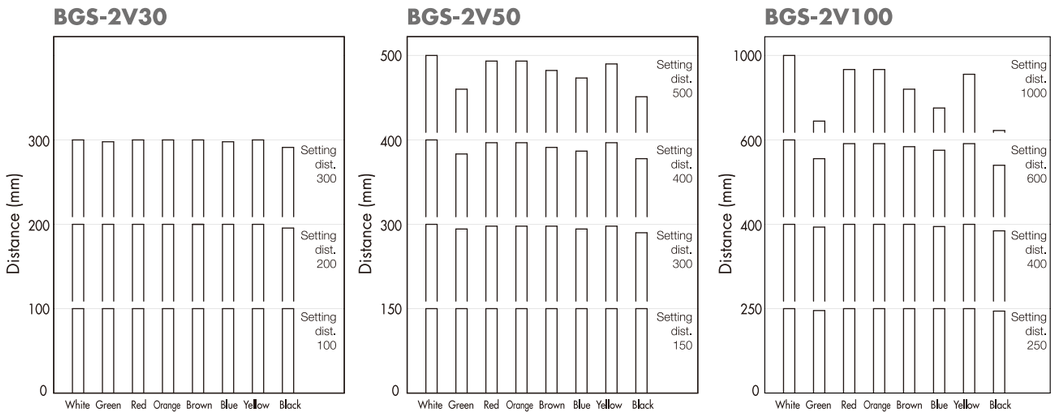
V2T-7000



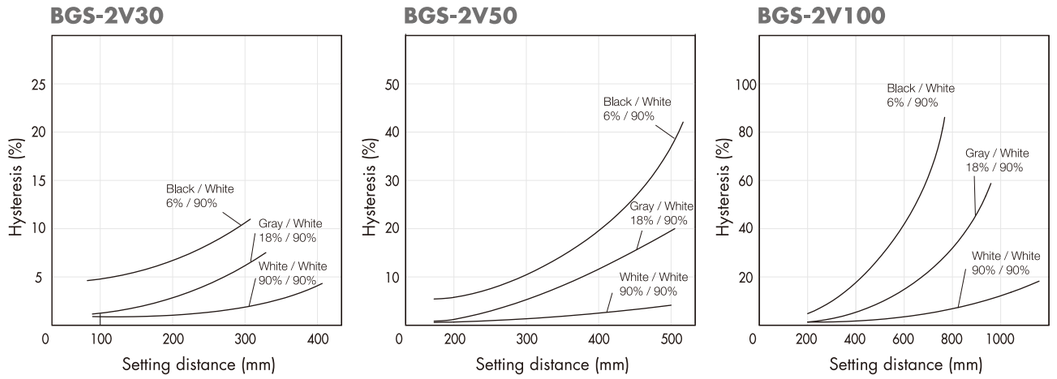
Material characteristics



Color characteristics

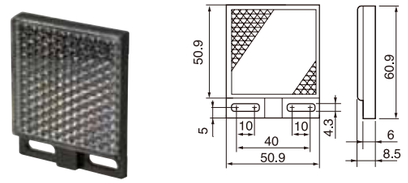


Hysteresis

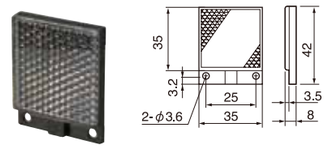


Options

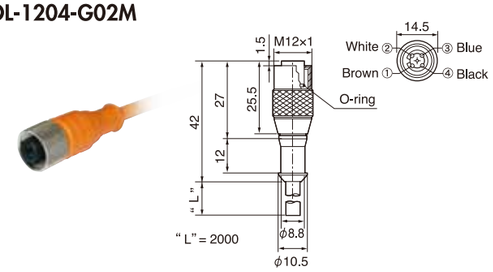
Standard reflector V-61



Small reflector V-42



M12 connector cable DOL-1204-G02M



(Unit : mm)

Photoelectric Sensor

V3 / V4 series

V4 series
AC Terminal chamber type

V3 series
Cable type

- Easy and quick disconnection for quick maintenance.
  Simply remove the main body from the base to replace the sensor.
- Long sensing distance - 70 meters thru-beam.
- Terminal connection (AC types - V4 series).

Applications

Access control

Easy replacement

New style of QD!
Simply replace the main body leaving the base and cable in place.

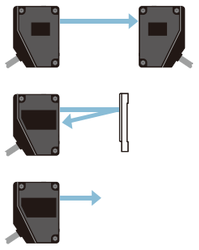
Strong light source! Ideal for dusty/dirty conditions.

Class B type, applicable to household use. Severely controlled to self-emission noise.

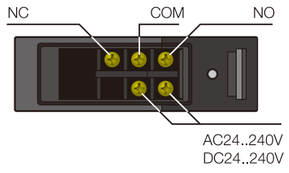
Old Type

NEW Class B Type

Long Sensing Range breaking through even in a foggy condition.

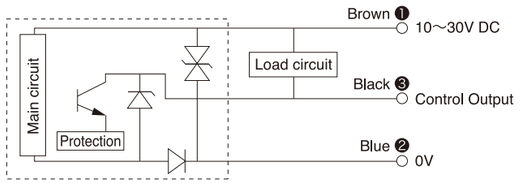


Terminal layout for easy connection(V4 series).

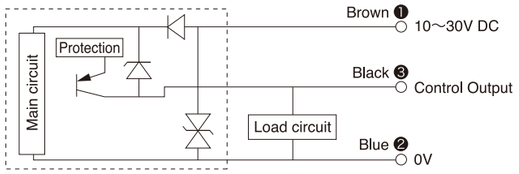


Circuit diagram (Transistor Output type)

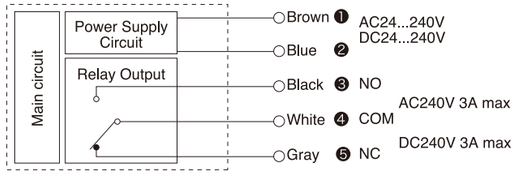
NPN output



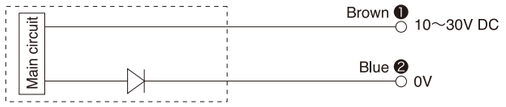
PNP output



AC/DC type

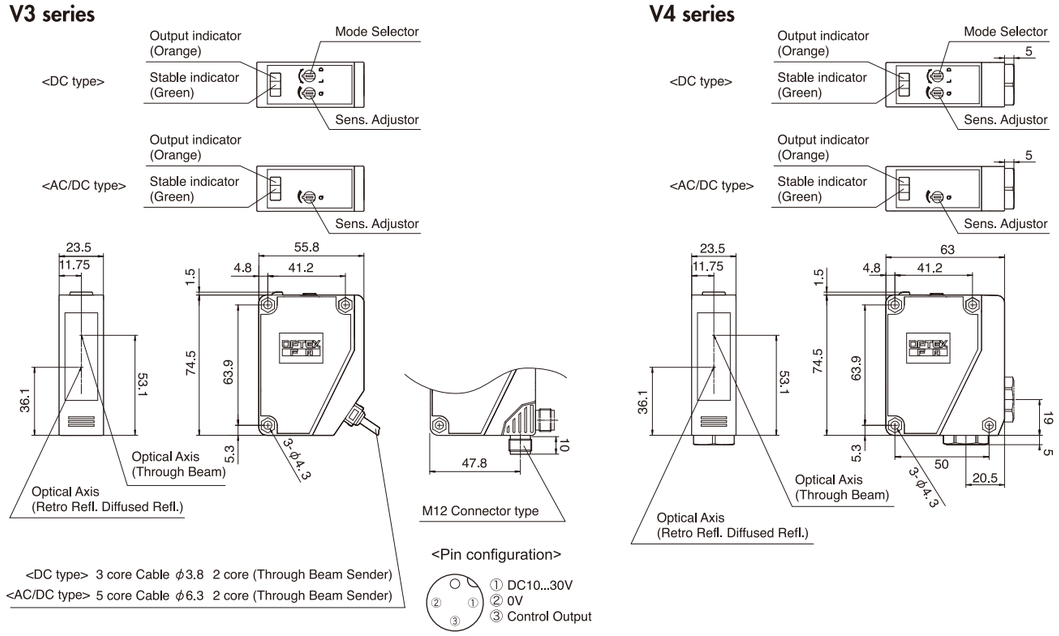


Emitter



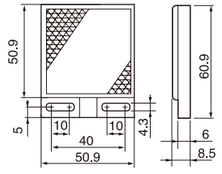
Dimensions

V3 series

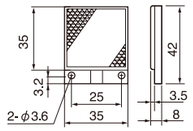


V4 series

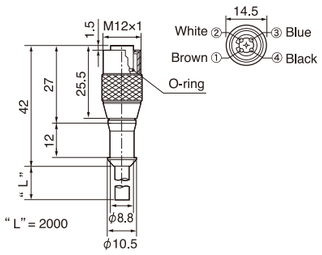
Standard reflector V-61



Small reflector V-42



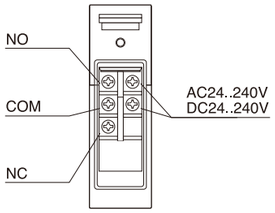
M12 connector cable DOL-1204-G02M



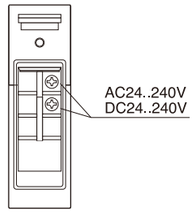
(Unit : mm)

Connections

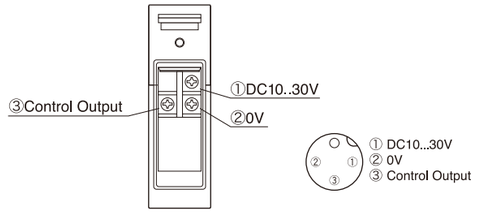
Relay type



Emitter



Transistor Output type



Specifications

Model	Relay output type			Transistor output type		
	Thru-beam	Retro-reflective	Diffuse reflective	Thru-beam	Retro-reflective	Diffuse reflective
V3 series (cable / QD type)	V3T-7000A (ClassA) V3T-7000 (ClassB)	V3R-1200A (ClassA) V3R-1200 (ClassB)	V3D-200A (ClassA) V3D-200 (ClassB)	V3T-7000N, P, CN, CP	V3R-1200N, P, CN, CP	V3D-200N, P, CN, CP
V4 series (Terminal type)	V4T-7000A (ClassA) V4T-7000 (ClassB)	V4R-1200A (ClassA) V4R-1200 (ClassB)	V4D-200A (ClassA) V4D-200 (ClassB)	V4T-7000N, P	V4R-1200N, P	V4D-200N, P
Supply voltage	DC24～240V ±10%	AC24～240V ±10% 50/60Hz		DC10～30V Including ripple (P-P) 10%		
Current Consumption	3VA max. (Class A), 4VA max. (Class B)	2VA max. (Class A), 2.5VA max. (Class B)		35mA max.		
Light source	Red LED (635nm)			Red LED (635nm)		
Sensing distance	70m	12m/ Reflector V-61	2m	70m	12m/ Reflector V-61	2m
Hysteresis	-		20% max.	-		20% max.
Sensitivity adjustment	One turn potentiometer			One turn potentiometer		
Response time	15ms			0.5ms max.		
Indicator	Output indicator (Orange LED) / Stable indicator (Green LED)			Output indicator (Orange LED)/ Stable indicator (Green LED)		
Operating mode	Light ON			Light ON/ Dark ON, selectable by potentiometer		
Control output	Relay output 1 Form C AC 240V / DC 30V, 3A max (Resistive)			NPN/ PNP open collector DC30V, 100mA max. (Residual voltage 1.8V max.)		
Relay lifetime	Mechanical: $5x10^7$ times / Electrical: 10^5 times			NIL		
Environmental illuminance	(Sunlight) 10,000lx (Incandescent Light) 3,000lx			(Sunlight) 10,000lx (Incandescent Light) 3,000lx		
Ambient Temperature	-25～55°C			-25～55°C		
Ambient Humidity	35～85%/RH			35～85%/RH		
Storage Temp./ Humidity	-40～70°C/ 35～95% RH			-40～70°C/ 35～95% RH		
Vibration Resistance	10～55Hz amplitude 1.5mm X, Y, Z each 2h			10～55Hz amplitude 1.5mm X, Y, Z each 2h		
Shock resistance	500m/s² X, Y, Z each 3 times			500m/s² X, Y, Z each 3 times		
Protection category	IEC 144 IP67			IEC 144 IP67		
UL	UL Recognition (ClassA model only)			UL Recognition		

Options

Standard reflector V-61

Small reflector V-42

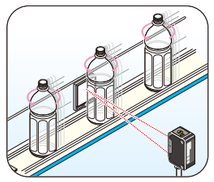
Connector cable DOL-1204-G02M

Photoelectric Sensor

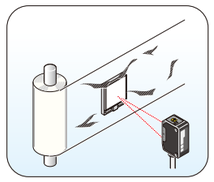
SR-Q series

- Ideal for sensing transparent objects.
- 100G of shock resistance rating.
- P45A small reflector, good for space saving.
- M8 QD types are available.

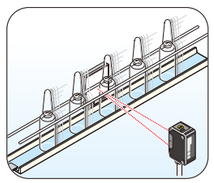
Applications



Beverage industry



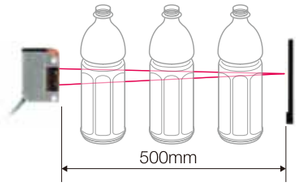
Packaging industry



Pharmaceutical industry

Stable detection of transparent objects.

PET bottles with any design / configuration are easily detected. The material of the bottle does not matter. Glass plates for flat panel display can be detected also.



High durability to ambient noise

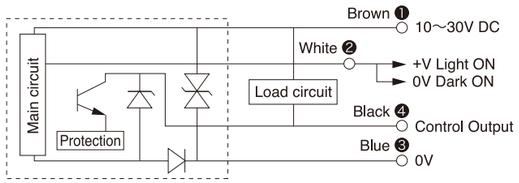
The sensor is designed to be resistant to electrical noise from relay contacts, inverters, electromagnetic fields, static,etc. The In-house testing (Failen Test) exceeds the IEC standard.

Rigid mechanics

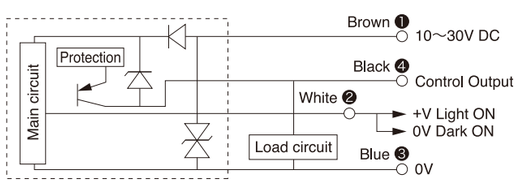
100G standard, tough enough to resist mechanical shock and vibration.

Circuit diagram

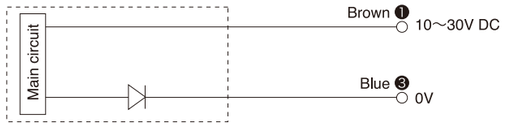
NPN output



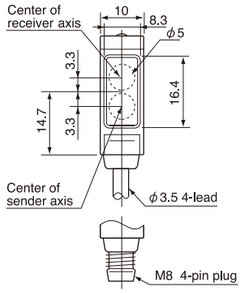
PNP output

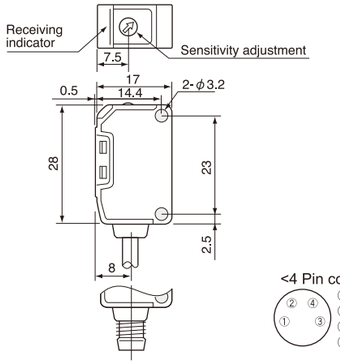


Emitter



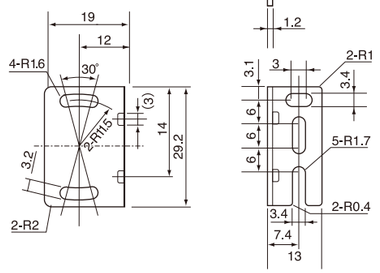
Dimensions



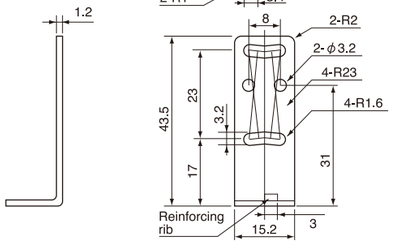


<4 Pin configuration>
① DC10～30V
② –
③ 0V
④ Control Output

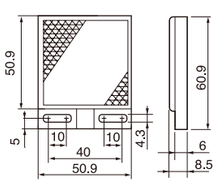
Standard Bracket for cable type (BEF-W150-A)



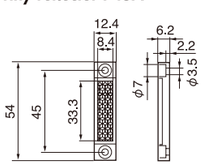
Standard Bracket for M8 QD type (BEF-W150-B)



Standard reflector V-61



Tiny reflector P45A



(Unit : mm)

Specifications

Model		Cable type	Connector type
NPN output		SR-Q50NW	SR-Q50CNW
PNP output		SR-Q50PW	SR-Q50CPW
Sensing distance		500mm (With V-61)	
Light source		Red LED (660nm)	
Response time		0.5ms	
Sensitivity adjustment		Sensitivity volume adjustment (270 degrees)	
Control output		NPN/PNP open collector, max. 100mA/30VDC	
Connection		4-lead cable, 2m	M8 4-pin
Insulation resistance		20MΩ Max. (500VDC)	
Supply voltage		10 to 30VDC including 10% of ripple	
Power consumption		30mA max.	
Noise resistance	JIS Standard	C4525 500V	
	IEC Standard	IEC801-2,3,4 Level 3	
Operating	Temp/humidity	–25 to 55°C/35 to 85%RH	
	Enviromental illuminance	Sunlight 10,000 lux max. /Incandescent light 3,000 lux max.	
	Vibration resistance	10 to 55Hz, Amplitude 1.5mm, X/Y/Z axis 2 hours	
	Shock resistance	Approx.100G (1000m/S^2). X/Y/Z axis 3 times on each	
	Protection category	IP67	
Material		PSF+PBT	
Weight		Approx. 5g (Without cable)	

Options

Standard reflector V-61

Tiny reflector P45A

Sensor stand PLN-1

Fixture of Reflector PLN-1M

JCN-S：**M8 Straight type**

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

JCN-L：**M8 L-shape type**

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

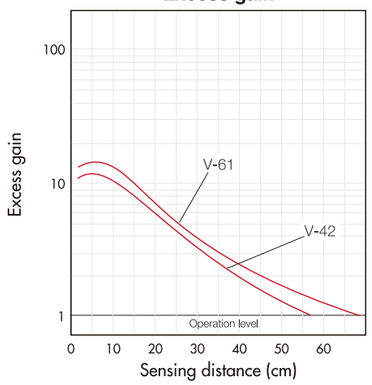
Protective mounting brackets

LS-S01

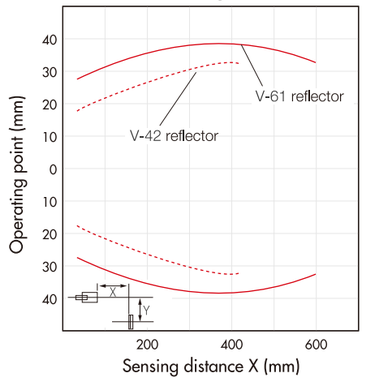
LS-S02

Reference (typical)

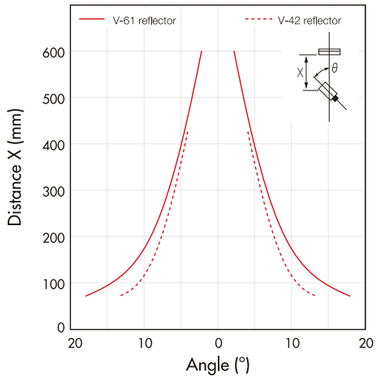
Excess gain



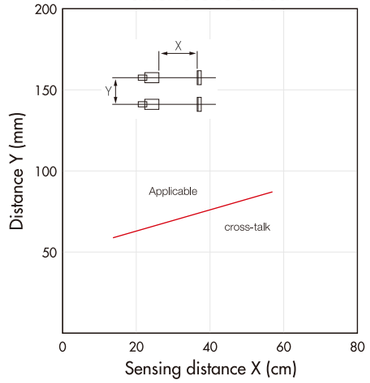
Sensing area



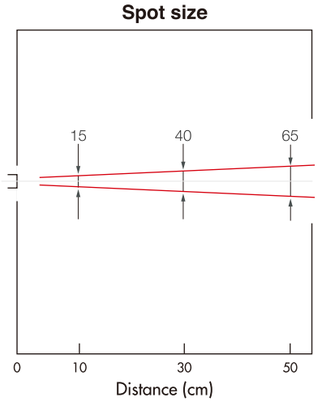
Angular deviation



Interference area



Spot size



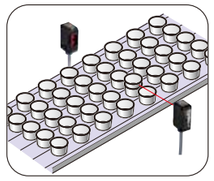
C
C2
E
J
J2
J3
V
V2
V3
V4
SR-Q
S
Z
BGS-Z
Z2
Z3
ZM
K
BGS-2S
Y
DM-18T
Accessory

Photoelectric Sensor

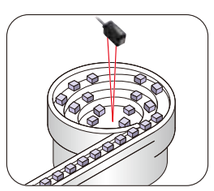
S series

- BGS functionality built into a small package!
- Built-in polarizing filter (Retro-reflective) type.
- 100G shock resistance rating.
- M8 QD for all types.

Applications

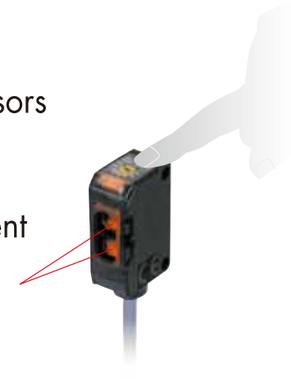


Double feeding of ice cream cup (ST-400)



Parts feeder (BGS-S08)

Extremely small BGS type sensors (BGS-S08 and S03) are only 17×10×20 mm.
Ideal for use in OEM equipment such as Printed Circuit Board processing machines.



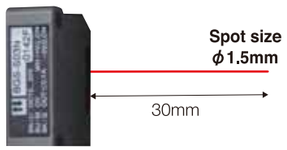
High rigidity for 100G shock resistance / IP67

Rigid design for high resistance to mechanical shock such as contact or collision.

0.5ms high speed response

High speed response even with transparent targets.

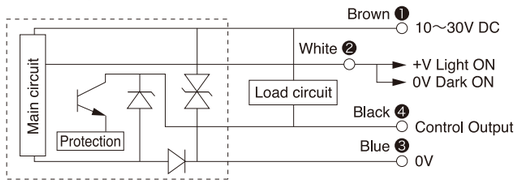
BGS-S03, with 1.5φ spot at 30mm distance



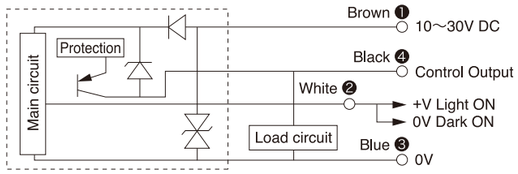
S
Z
BGS-Z
Z2
Z3
ZM
K
BGS-2S
Y
DM-18T
Accessory

Circuit diagram

NPN output



PNP output

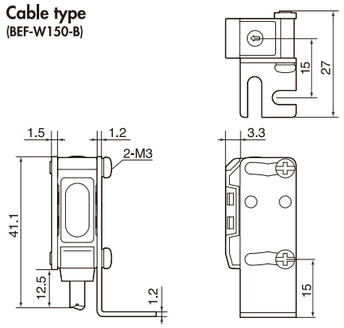


Emitter

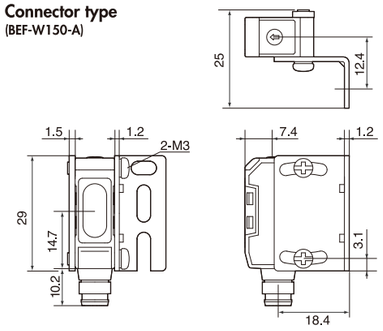
Dimensions

S series

Cable type
(BEF-W150-B)

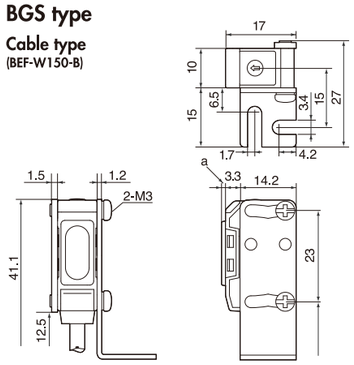


Connector type
(BEF-W150-A)

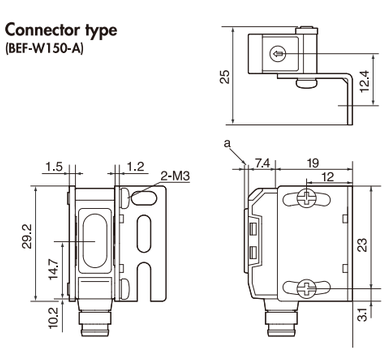


BGS type

Cable type
(BEF-W150-B)



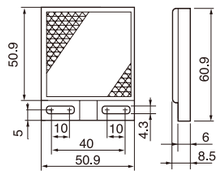
Connector type
(BEF-W150-A)



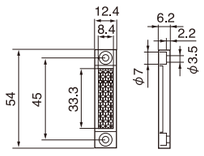
<4 Pin configuration>

① DC10～30V
② –
③ 0V
④ Control Output

Standard reflector V-61



Tiny reflector P45A



(Unit : mm)

Specifications

Model		Thru-beam	Retro-reflective with polarizing Filter	Diffuse reflective	BGS	
Cable type	NPN	ST-400N	SR-150N	SD-20N	BGS-S08N	BGS-S03N
	PNP	ST-400P	SR-150P	SD-20P	BGS-S08P	BGS-S03P
Connector type	NPN	ST-400CN	SR-150CN	SD-20CN	BGS-S08CN	BGS-S03CN
	PNP	ST-400CP	SR-150CP	SD-20CP	BGS-S08CP	BGS-S03CP
Sensing distance		4 m	1.5 m	200 mm	10 to 80 mm	10 to 30 mm
Supply voltage		10 to 30V DC including 10% of ripple				
Power consumption		30mA	20mA Max			
Hysteresis		—		20% MAX	10% MAX	
Minimum detectable object		ϕ6 opaque object	□45mm opaque object	—		
Response time		0.5msec Max				
Control output		NPN or PNP Open collector, 100mA Max / 30V DC				
Operating mode		Light ON / Dark ON selectable				
Sensitivity adjustment		1-turn potentiometer			5-turn potentiometer	
LED Indicator		Red				
Operating temp / humidity		–25 to +55°C / 35 to 85%RH				
Protection category		IP67				
Environmental illuminance		Sun Light:10,000 lux max. Incandescent lamp:3,000 lux max.				
Shock resistance		100G（1,000m/S^2）X,Y,Z, axis 3 times				
Vibration resistance		10 to 55 Hz amplitude 1.5mm, X-Y-Z for 2 hours				
Connection		"Cable type: Cable length 2m ϕ3.5mm (Longer cable type of 5m is available as option) Connector type: M8 × 4-pin connector"				

Options

Standard reflector V-61

Tiny reflector P45A

Sensor stand
PLN-1

Fixture of Reflector
PLN-1M

JCN-S：**M8 Straight type**

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

JCN-L：**M8 L-shape type**

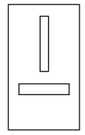
JCN-L : 2 meter
JCN-5L : 5 meter
JCN-10L : 10 meter

Protective mounting brackets.

L-shape type
LS-S01

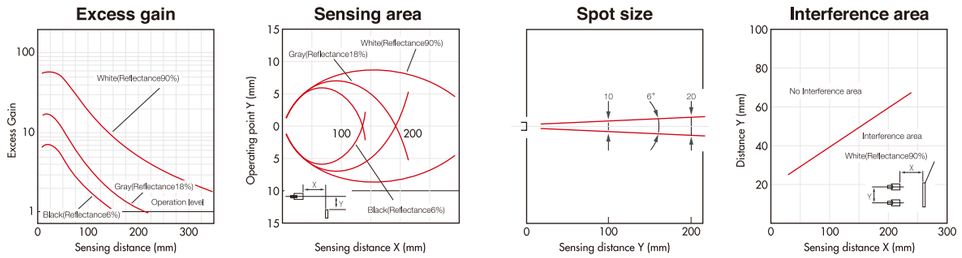
Straight type
LS-S02

BL-150-10
Slit mask for ST-400

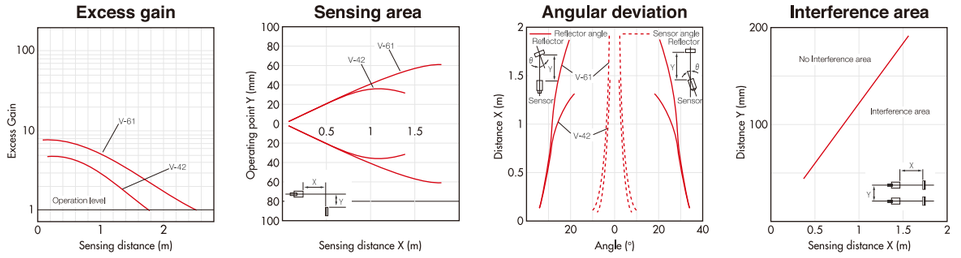


Reference (typical)

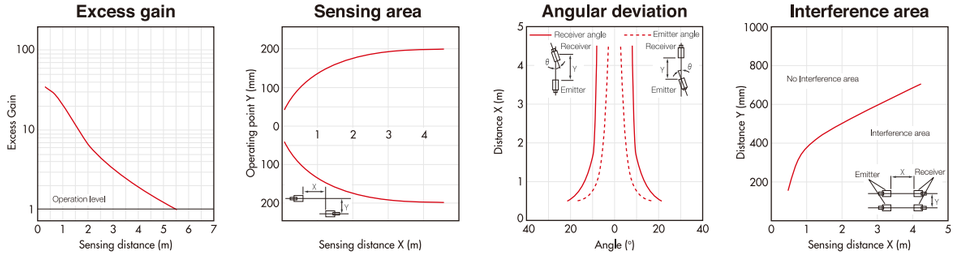
SD-20N



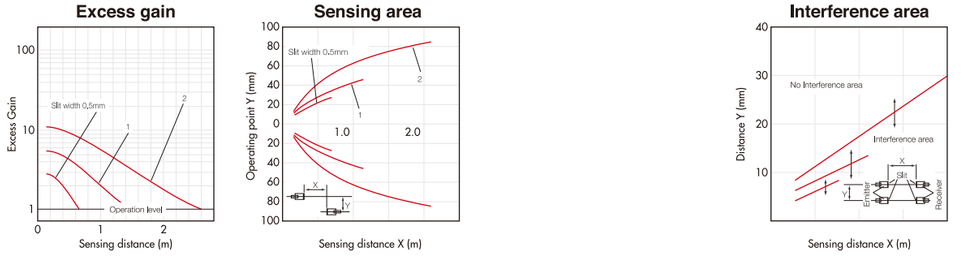
SR-150N



ST-400N



ST-400N & SLIT BL-150-10

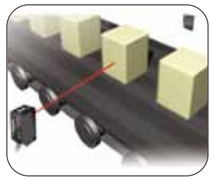


Photoelectric Sensor

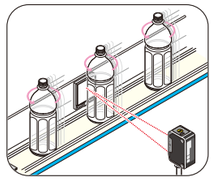
Z / BGS-Z series

- High Performance, Low Cost! All models offer cost and space savings.
- ZR-Q series. Ideal for detection of transparent objects! Plastic bottles, film, etc.
- ZR-X/QX series, Coaxial beam. Sensing through narrow opening is possible!
- BGS-Z series. High performance in small package!!
  Tough sensor! 100G shock resistance and IP67 ratings.

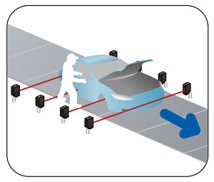
Applications



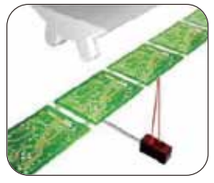
For material handling (ZR-350)



Beverage industry (ZR-QX200)



Car on the production line (ZT-1200)

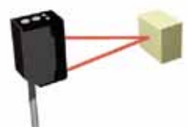


PCB (BGS-Z10N)

Thru-Beam type

ZT-1200N／ZT-1200P
ZT-1200CN／ZT-1200CP

Convergent type

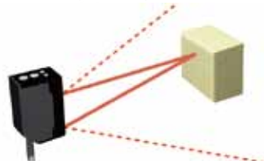


ZD-L09N／ZD-L09P
ZD-L09CN／ZD-L09CP

Retro Reflective type

ZR-350N／ZR-350P
ZR-350CN／ZR-350CP

Diffuse type (incl,divergent type)



Diffuse
ZD-70N／ZD-70P
ZD-70CN／ZD-70CP

Divergent
ZD-W20N／ZD-W20P
ZD-W20CN／ZD-W20CP

BGS type

BGS-Z30N／BGS-Z30P
BGS-Z30CN／BGS-Z30CP
BGS-Z10N／BGS-Z10P
BGS-Z10CN／BGS-Z10CP

Coaxial LED type

General use
ZR-X250N／ZR-X250P
ZR-X250CN／ZR-X250CP

Transparent objects
ZR-QX200N／ZR-QX200P
ZR-QX200CN／ZR-QX200CP

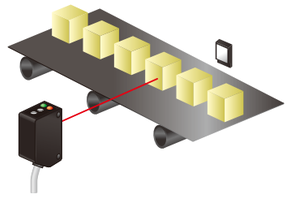
General Purpose

- ***100G shock resistance, IP67 ratings. Tough sensor !***
- ***ZR-Q series, ideal for detection of PET bottles, transparent objects, etc.***
- ***Standard models for cost saving.***

Features

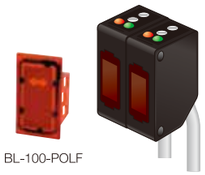
500μsec response

Good for fast moving objects.



Cross-talk prevention

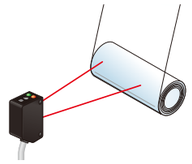
With built-in cross-talk prevention, it is possible to mount two sensors side-by-side without mutual interference.
(Use part number BL-100-POLF for thru-beam type sensors.)



BL-100-POLF

ZD-W20 wide angle applications

The Divergent type ZD-W20 provides a wide angle beam that can be used to detect transparent film by collecting the reflected light from the material surface.



IP67 rating

Hose it down!
Water-tightness is tested to IP67.

Rugged 100G shock rating

Rigid design for high resistance to mechanical shock

Threaded mounting holes

Prevents sensor from being damaged when it's mounted.

Specifications

Model		Thru-beam	Polarized Retro-reflective	Diffuse-reflective	Convergent	Divergent	Glass detection
Cable type	NPN	ZT-1200N	ZR-350N	ZD-70N	ZD-L09N	ZD-W20N	ZR-Q200N
	PNP	ZT-1200P	ZR-350P	ZD-70P	ZD-L09P	ZD-W20P	ZR-Q200P
M8 Connector type	NPN	ZT-1200CN	ZR-350CN	ZD-70CN	ZD-L09CN	ZD-W20CN	ZR-Q200CN
	PNP	ZT-1200CP	ZR-350CP	ZD-70CP	ZD-L09CP	ZD-W20CP	ZR-Q200CP
Sensing distance		12 m	3.5m (V-61 reflector)	70cm	1-9 cm	1-200 mm	2 m (V-61 reflector)
Response time		0.5 msec					
Spot size		1.5m @ 12 meter	350mm @ 3.5 meter	100mm @ 700mm	12mm @ 90mm	30mm @ 50mm	300mm @ 2 meter
Operating mode		Light On/Dark On selectable					
Hysteresis		NIL		20% Max	10% Max	20% Max	NIL
Light source		Red LED					
Sensitivity adjustment		1-turn trimmer (240 degree)					
Control output		NPN or PNP Open collector, 100mA Max / 30V DC					
Supply voltage		DC 10 - 30V incl. 10% ripple					
Power consumption		20mA Max					
LED Indicator		Dual Indicator (Output : orange, Stable : green)					
Protection category		IP67					
Shock resistance		100G (1,000m/S^2)					
Environmental illuminance		Sunlight : 10,000 lux Max., Incandescent lamp : 3,000 lux max.					
Operating temp/humidity		–25 to 55°C / 35 to 85%RH					
Materials		ABS with glass fiber (Case), PMMA (Lens)					

Retro-Reflective with Coaxial LED

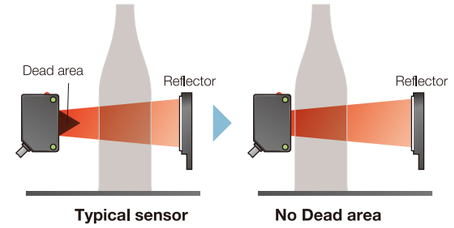
The best for transparent Plastic / Glass detection

- ***Coaxial LED source gives extremely tight alignment to the target.***
- ***Alignment of sensor is easy thanks to bright projected LED spot.***
- ***250 μsec fast response (ZR-X, coaxial beam type)***
- ***World's standard model ZR-Q (general type) and ZR-QX (coaxial beam type) for Plastic and Glass applications.***

Features

Zero dead area!

The sensor has no dead area in the sensing field.
This makes it ideal for use on conveyors where the position of the target changes.

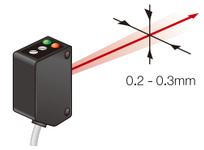


Good selection of sensors for various types of bottles.

Glass and plastic bottles come in various shapes / sizes and with many different contours which require testing in the field to determine the best sensor for the application.
The Z series is offered with both Co-axial and Conventional LED light sources to provide a solution for the detection of any bottle type.

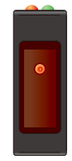
Repeat Accuracy

Very tight Repeat Accuracy, 0.2 - 0.3mm for BGS type.
Even Thru-beam and Retro types have 0.3mm Repeat Accuracy(*).
*=Tested at the middle point of sensing range.



Coaxial LED

Coaxial LED light source provides extremely tight alignment to the target, Alignment of sensor is very easy thanks to bright projected LED spot.



Specifications

Model		Retro Reflective for Transparent				Polarized Retro-reflective (Coaxial Beam)	
		General Use		Coaxial Beam			
		2m Cable	M8QD 4pin	2m Cable	M8QD 4pin	2m Cable	M8QD 4pin
Type	NPN	ZR-Q200N	ZR-Q200CN	ZR-QX200N	ZR-QX200CN4	ZR-X250N	ZR-X250CN4
	PNP	ZR-Q200P	ZR-Q200CP	ZR-QX200P	ZR-QX200CP4	ZR-X250P	ZR-X250CP4
Sensing distance		0.01 - 2 meter (V-61 reflector)		0 - 2 meter (P250F reflector)		0 - 2.5 meter (V-61 reflector)	
Response time		0.5 msec				250µs	
Spot size		ϕ300mm / at 2m		ϕ60mm / at 2m		ϕ60mm / at 2m	
Operating mode		Light On / Dark On selectable					
LED Indicator		Output : orange, Stable : green		Output : orange		Output : orange, Stable : green	
Light source		Red LED					
Sensitivity adjustment		1-turn pot.					
Control output		NPN or PNP open collector, 100mA max / DC30V					
Supply voltage		DC 10 - 30V, including 10% ripple					
Power consumption		20mA max					
Protection category		IP 67					
Shock resistance		100G (1,000m/S^2)					
Environmental illuminance		Sunlight : 10,000 lux max., Incandescent lamp : 3,000 lux max					
Operating temp/humidity		–25 to 55°C/ 35 to 85% RH					
Materials		ABS(Case), PMMA(Lens)					

"M8-QD in 3 pins for European machines " are available with extention code of -CN(P)3, for instance, "ZR-QX200CN3".

BGS - LED Type

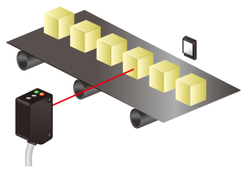
General purpose applications

- ***BGS (Background Suppression Type) Sensors are not influenced by the background, available with conventional LED light source.***

Features

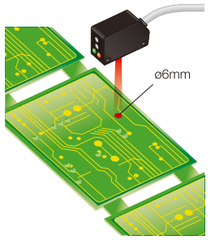
500μsec response

Good for fast moving objects.



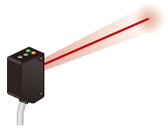
Large projected spot size

The LED version of the BGS sensors projects a large 6 mm spot that will not be affected by small holes in a PC board.
For PC boards that may have larger holes, the BGS-Z30 has an 18 mm projected spot size.



High power narrow beam LED

LED beam spot can be seen easily even in bright environment that helps installation.



4 Turn adjustment pot.

A four turn adjustment pot. is built-in for precise adjustment of the sensing distance.
The potentiometer has a slip clutch that protects it from damage when it is turned past the end.

Specifications

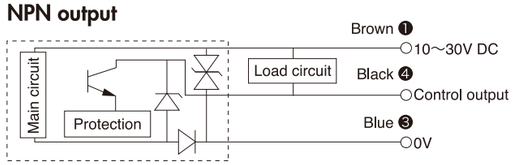
Model		long distance		short distance	
		2m Cable	M8QD 4pin	2m Cable	M8QD 4pin
Type	NPN	BGS-Z30N	BGS-Z30CN	BGS-Z10N	BGS-Z10CN
	PNP	BGS-Z30P	BGS-Z30CP	BGS-Z10P	BGS-Z10CP
Adjustable distance		50 - 300 mm (*1)		20 -100 mm (*1)	
Sensing distance		10 - 300 mm (*1)		5 -100 mm (*1)	
Response time		500μs			
Spot size		ϕ30mm / 300mm		ϕ10mm / 100mm	
Hysteresis (white to white)		5%		3%	
Operating mode		Light On / Dark On selectable			
LED Indicator		Output : orange, Stable : green			
Light source		Red LED			
Sensitivity adjustment		4-turn, endless pot.			
Control output		NPN or PNP open collector, 100mA max / DC30V			
Supply voltage		DC 10 - 30V, including 10% ripple			
Power consumption		30mA max			
Protection category		IP 67			
Shock resistance		100G (1,000m/S^2)			
Environmental illuminance		Sunlight : 10,000 lux max., Incandescent lamp : 3,000 lux max			
Operating temp / humidity		–25 to 55oC / 35 to 85% RH			
Materials		ABS(Case), PMMA(Lens)			

"M8-QD in 3 pins for European machines " are available with extention code of -CN(P)3, for instance, "ZR-QX200CN3".

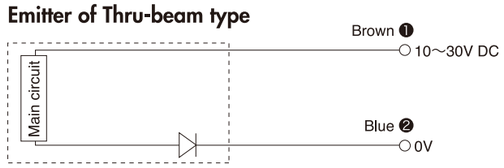
*1 white paper 100 X 100mm

Circuit diagram

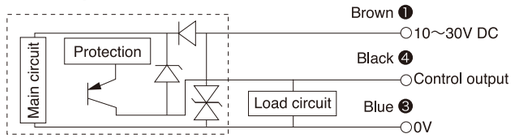
NPN output



Emitter of Thru-beam type

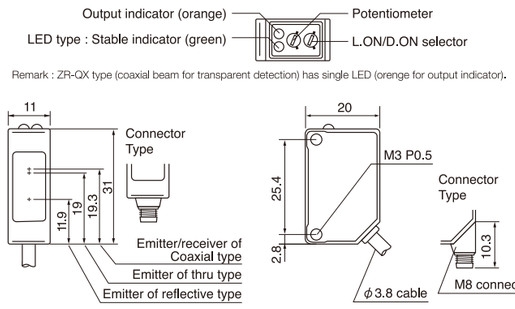


PNP output



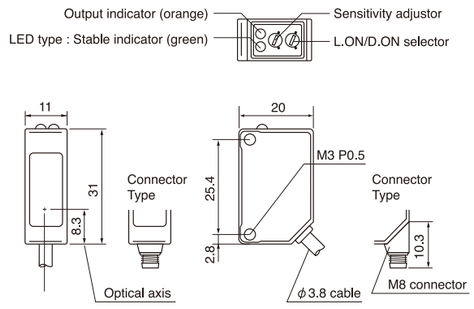
Dimensions

General Use Type except BGS



Remark : ZR-QX type (coaxial beam for transparent detection) has single LED (orenge for output indicator).

BGS Type



<Cable>
Brown : DC10~30V
Blue : GND
Black : Control Output
Gray : Laser OFF (Laser type only)
(NPN connect to GND / PNP connect to DC10~30V)

<3 Pin configuration>

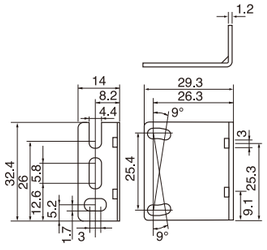
① DC10~30V
③ 0V
④ Control Output

<4 Pin configuration>

① DC10~30V
② Laser OFF (Laser type only)
(NPN connect to GND / PNP connect to DC10~30V)
③ 0V
④ Control Output

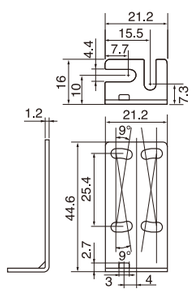
Standard bracket BEF-W100-A

Accessory for M8 QD type sensors

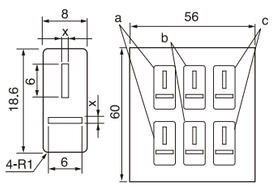


Standard bracket BEF-W100-B

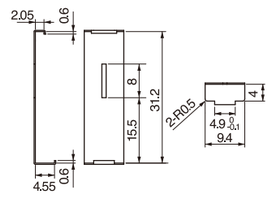
Accessory for cabled type sensors



Slit mask BL-160-SK (for Thru-beam type)



Metal (SUS) Slit mask BL-100-M1 (for Thru-Beam Type)

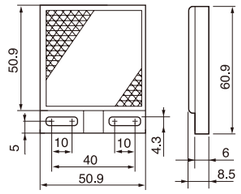


Type	Size	Attached to	Object size (Min)	Scanning range
Slit a	0.5mm	Receiver,Emitter	0.4mm	0.8mm
Slit b	1mm	Receiver,Emitter	0.6mm	2.5mm
Slit c	2mm	Receiver,Emitter	1.5mm	5mm

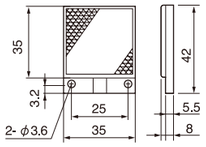
(Unit : mm)

Reflectors for LED Type

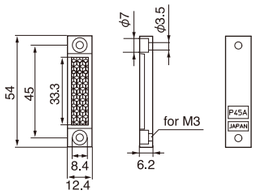
Standard reflector V-61 (Standard, LED type)



Small reflector V-42 (Optional, LED type)

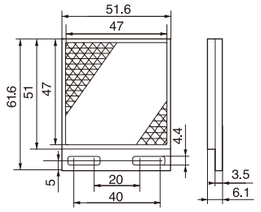


Tiny reflector P45A (Optional, LED type)

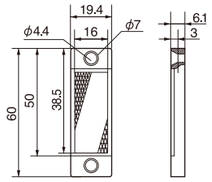


Reflectors for Coaxial LED Type

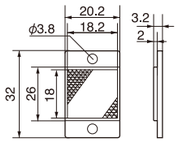
P250F (Standard,ZR-QX200)



PL20F (Optional)



PL10F (Optional)



Detection distance by reflectors

	P250F	PL20F	PL10F
ZR-QX	4.0	2.8	1.0

(Unit : mater)

Options

Standard reflector V-61 (Except ZR-QX200)

Small reflector V-42

Tiny reflector P45A

P250F (ZR-QX200,standard)

PL20F (Optional)

PL10F (Optional)

JCN-S : M8 Straight type

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

JCN-L : L-shape M8 type

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

Protective mounting brackets

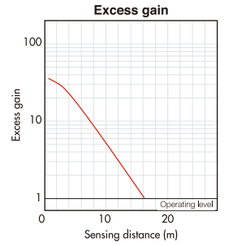
LK-S01

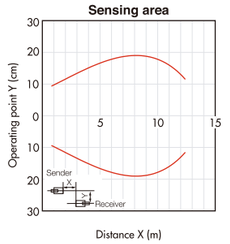
LK-S02

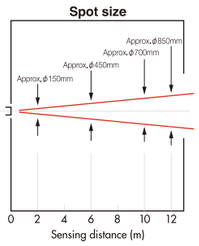
BL-100-POLF: Cross-talk prevention filter for ZT-1200

Reference (typical)

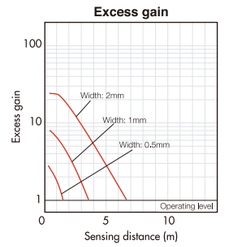
ZT-1200

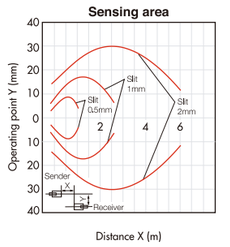




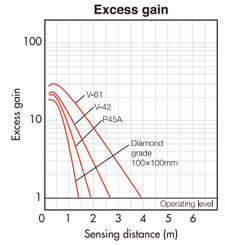


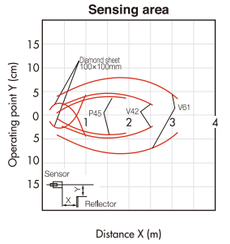
ZT-1200 & SLIT

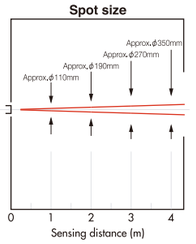


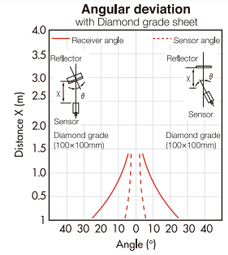


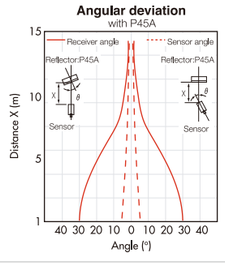
ZR-350

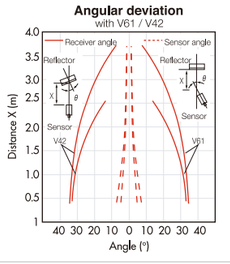




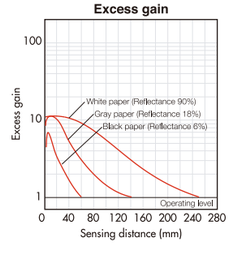


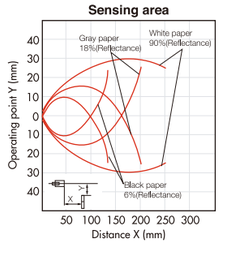






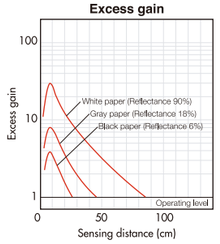
ZD-20W

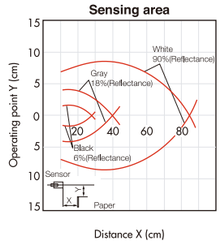


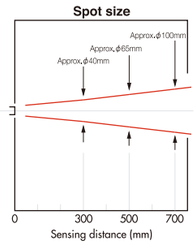


Reference (typical)

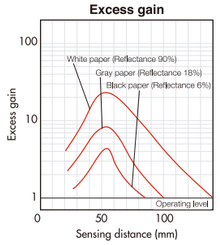
ZD-70

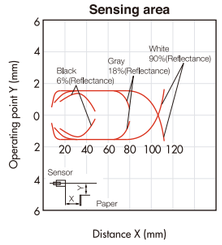


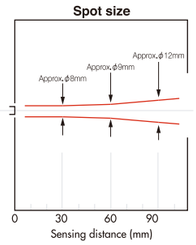




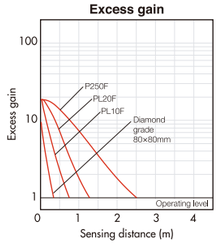
ZD-L09

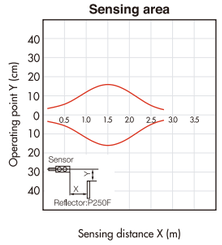


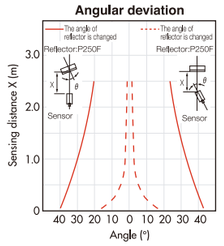


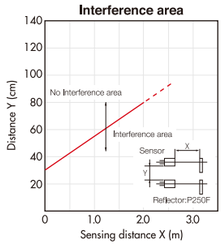


ZR-QX200

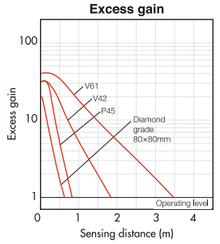


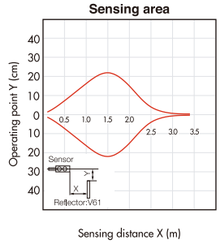


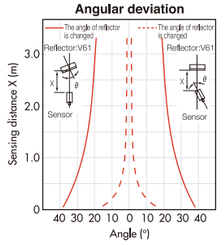


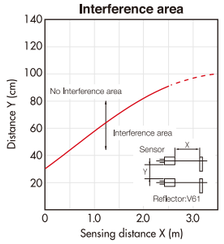


ZR-X250

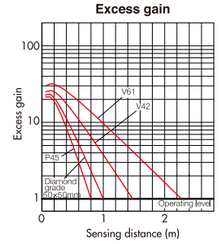


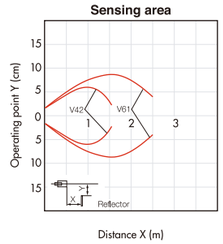


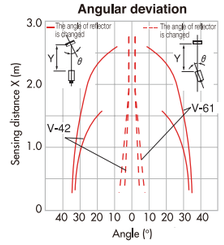


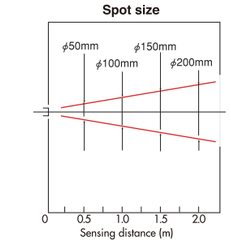


ZR-Q200



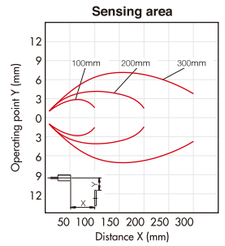


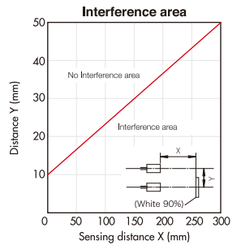


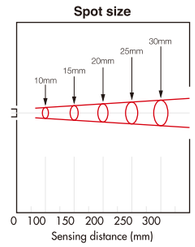


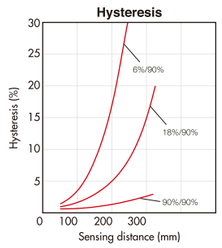
Reference (typical)

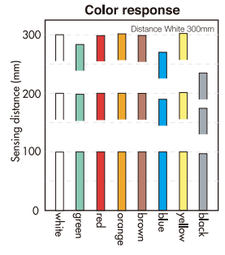
BGS-Z30

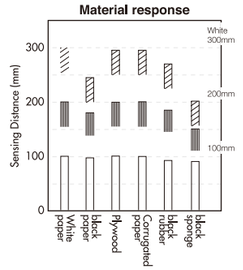




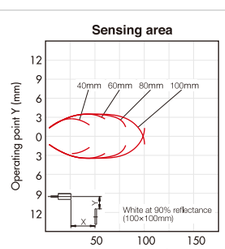


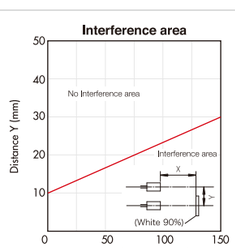


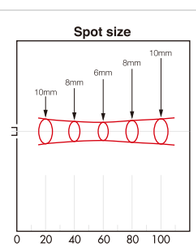


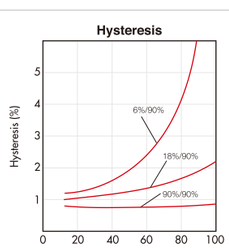


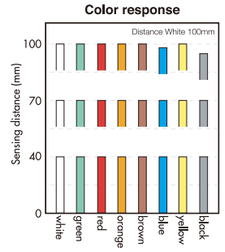
BGS-Z10

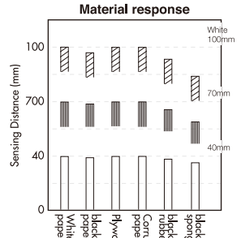










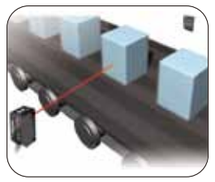


Photoelectric Sensor

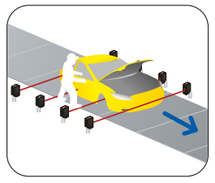
Z2 series

- Best-in-class Photosensors realized by high power LED.
- 3 basic types with detecting distance of 25 meter (thru-beam)

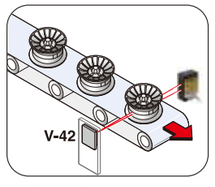
Applications



For material handling (Z2R-400)



Car on the production line (Z2T-2000)



Counting wheels (Z2R-400)

Thru-Beam type

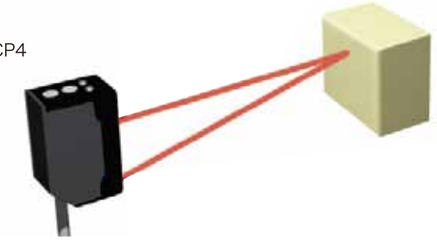
Z2T-2000N／Z2T-2000P
Z2T-2000CN4／Z2T-2000CP4

Retro Reflective type

Z2R-400N／Z2R-400P
Z2R-400CN4／Z2R-400CP4

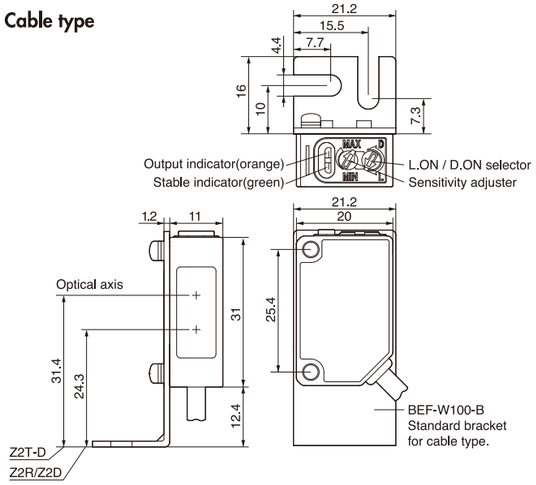
Diffuse type

Z2D-80N／Z2D-80P
Z2D-80CN4／Z2D-80CP4

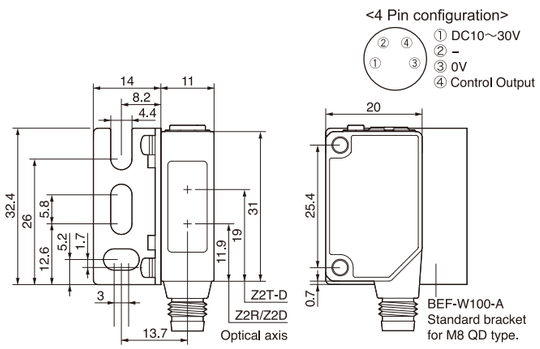


Dimensions

Cable type



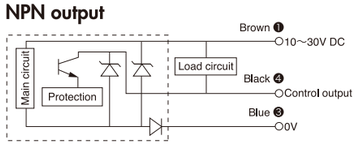
M8 QD type



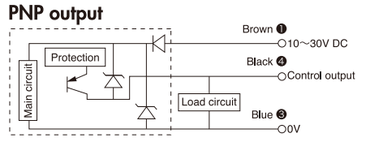
(Unit : mm)

Circuit diagram

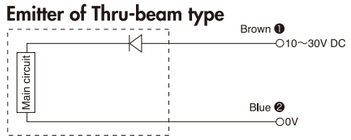
NPN output



PNP output

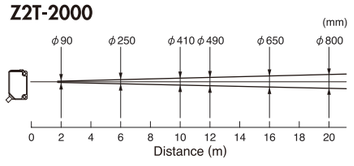


Emitter of Thru-beam type

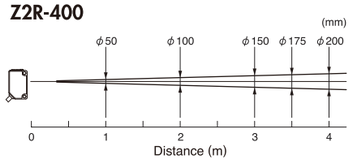


Spot size

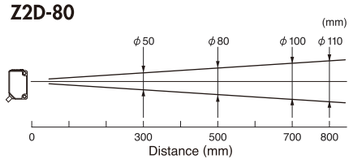
Z2T-2000



Z2R-400



Z2D-80



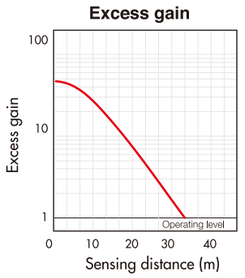
Specifications

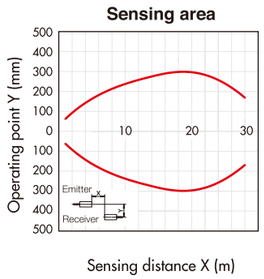
Model	Thru-beam	Retro-reflective	Diffuse-reflective
Cable type	Z2T-2000(N,P)	Z2R-400(N,P)	Z2D-80(N,P)
M8 QD type	Z2T-2000C(N4,P4)	Z2R-400C(N4,P4)	Z2D-80C(N4,P4)
Sensing distance	25m	0.01～4m ※1	0～80cm ※2
Response time	500μs max.		
Spot size	ϕ800mm @ 20m	ϕ200mm @ 4m	ϕ110mm @ 80cm
Operating mode	Light ON / Dark ON selectable		
LED Indicator	Output : orange, Stable : green		
Light source	Red LED		
Sensitivity adjustment	1-turn volume		
Control output	NPN or PNP Open collector, 100mA Max. DC30V Max. (Residual voltage 1.8V Max.)		
Supply voltage	DC10-30V Including 10% ripple(P-P)		
Power consumption	Emitter : 20mA Max.	20mA Max.	
	Receiver : 15mA Max.		
Protection category	IP67		
Shock Resistance	100G		
Vibration Resistance	10-55Hz, 15mm X,Y,Z, each. 2 hours		
Ambient temp. / humidity	–25～+55°C / 35～85% RH (No condensation or freezing)		
Storage temp. / humidity	–40～+70°C / 35～95% RH (No condensation or freezing)		
Material	Case : ABS (glass included) Front Cover , Lens : PMMA		

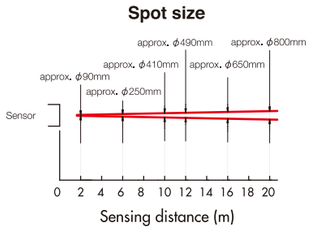
※1. Reflector V-61
※2. White 90% 100mm×100mm

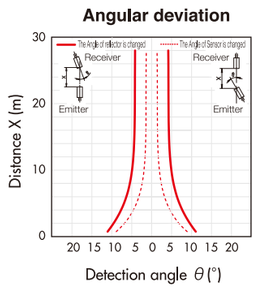
Reference (typical)

Z2T-2000



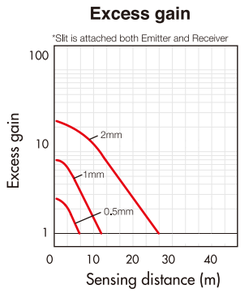


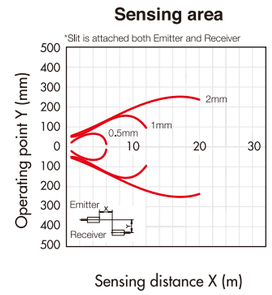


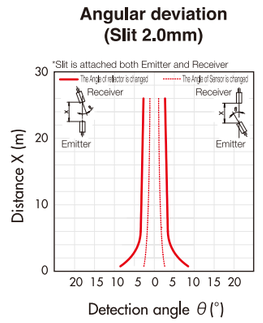


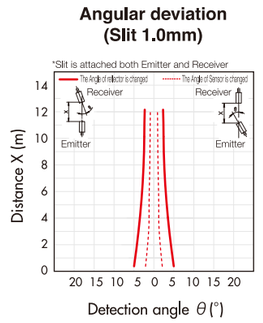
Reference (typical)

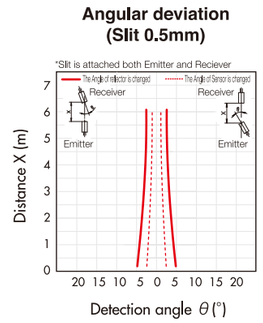
Z2T-2000 + Slit



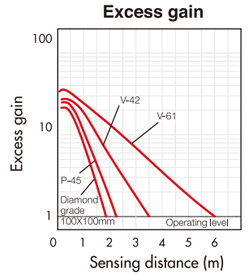


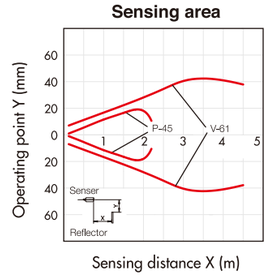


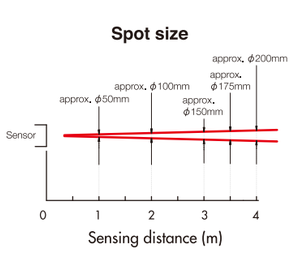


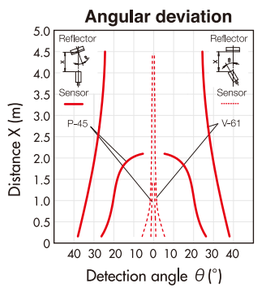


Z2R-400

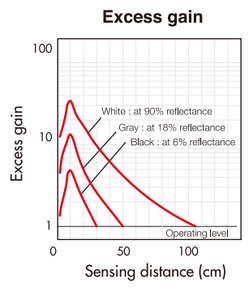


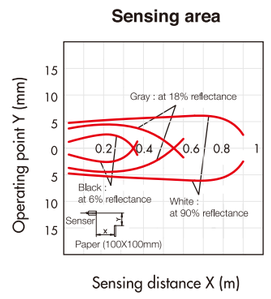


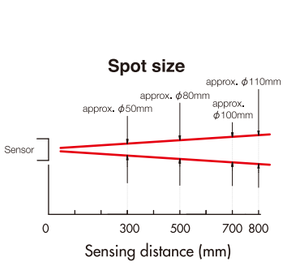




Z2D-80







Photoelectric Sensor

Z3 series

FASTUS

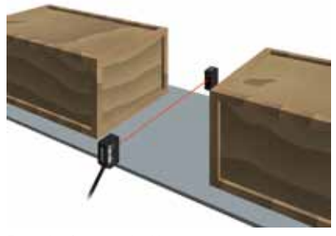
- Longest-in-class sensing distance of 25m (through-beam type)
- Significantly reduced dead zone (diffuse-reflective type)
- Indicators clearly visible from anywhere

Applications

Detecting or counting boxes flowing through a process (Retro-reflective type)

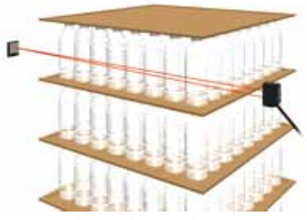
Detecting plastic bottles on a conveyor (Retro-reflective type for transparent object detection)

Detecting tires protruding from conveyors (Through-beam type)



Detecting large packed items on a conveyor (Through-beam type)

Detecting boxes protruding from shelves (Through-beam type)



Detecting palletized plastic bottles (Retro-reflective type for transparent object detection)

Lineup

Model (M8 Connector type)		Type	Appearance	Sensing range
NPN type	PNP type			
Z3T-2500N (Z3T-2500CN4)	Z3T-2500P (Z3T-2500CP4)	Through-beam		25 m
Z3R-400N (Z3R-400CN4)	Z3R-400P (Z3R-400CP4)	Retro-reflective*		0.01 to 4 m
Z3D-100N (Z3D-100CN4)	Z3D-100P (Z3D-100CP4)	Diffuse-reflective		0 to 1 m
Z3D-L09N (Z3D-L09CN4)	Z3D-L09P (Z3D-L09CP4)	Limited-reflective		10 to 90 mm
Z3R-Q200N (Z3R-Q200CN4)	Z3R-Q200P (Z3R-Q200CP4)	Transparent object detection*		0.01 to 2 m

*Reflectors sold separately

The next evolution of the globally acclaimed Z series standard photoelectric sensor

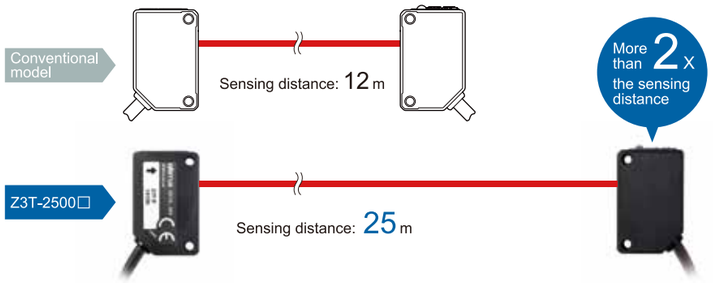
Over 3 Million units of the Z series have been shipped globally. FASTUS set out to improve upon the design of this popular self-contained photoelectric sensor series while keeping the same ease of use. Introducing the new Z3 series with greatly improved detection performance, usability, and increased value for the money. The Z3 series easily exceeds the requirements of general-purpose photoelectric sensors.

High Power LED Provides Stable Detection

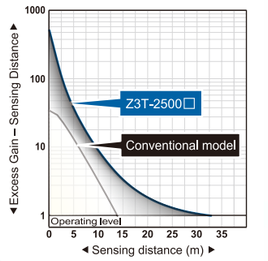
The Z3 series through-beam type sensor has a 25 m sensing distance, the longest in its class. This high power provides a significant increase in excess gain, which helps the sensor overcome interference from dust or other fine particles.

Plus

- Easy optical axis adjustment thanks to a large spot size with good visibility
- Four-element LED helps reduce beam degradation during long-term use



Excess Gain – Sensing Distance

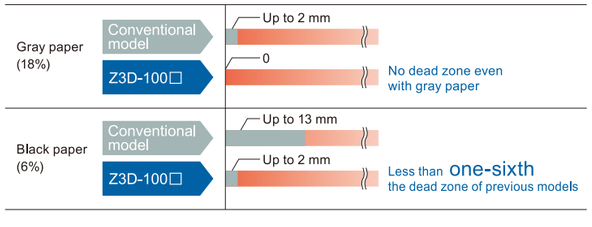


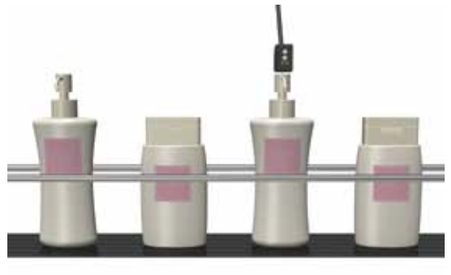
Output and stability indicators are brighter than those of conventional models and easier to view from any direction.

Significantly Reduced Dead Zone

The diffuse-reflective type features an optimized optical receiver system that successfully minimizes the dead zone in front of the lens. This makes it easier to detect workpieces with a low reflectivity that pass close to the sensor even on lines that convey workpieces of varying heights.

Close range dead zone (typical values)





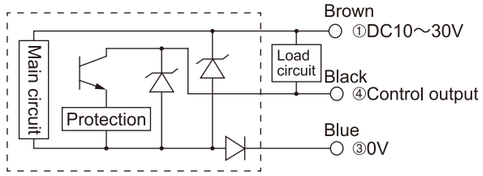
Specifications

Model		Through-beam	Retro-reflective	Diffuse-reflective	For transparent object detection	
Cable type	NPN	Z3T-2500N	Z3R-400N	Z3D-100N	Z3R-Q200N	Z3D-L09N
	PNP	Z3T-2500P	Z3R-400P	Z3D-100P	Z3R-Q200P	Z3D-L09P
Connector type	NPN	Z3T-2500CN4	Z3R-400CN4	Z3D-100CN4	Z3R-Q200CN	Z3D-L09CN4
	PNP	Z3T-2500CP4	Z3R-400CP4	Z3D-100CP4	Z3R-Q200CP4	Z3D-L09CP4
Sensing distance		25 m	0.01 to 4 m*1	0 to 1 m*2	0.01 to 2 m*1	10 to 90 mm*3
Response time		500 µs or less				
Spot size		ø1800 mm (at distance of 25 m)	ø280 mm (at distance of 4 m)	ø75 mm (at distance of 1 m)	ø140 mm (at distance of 2 m)	ø8 mm (at distance of 90 mm)
Operating mode		Light on, Dark on (Selectable by switch)				
Hysteresis		—	—	20% Max.	—	10% Max.
Light source		Four-element red LED, wavelength 632 nm				
Sensitivity adjustment		Single-turn adjuster				
Indicators		Output display: orange LED, Stability display: green LED (through-beam type emitter has no indicators)				
Control output		NPN/PNP type open collector Max.100 mA/30 VDC				
Connections		Cable type: cable length 2 m x ø3.8 mm/Connector type: M8 4 pin				
Power supply voltage		10 to 30 VDC Including ripple (P-P) 10%				
Current consumption		Emitter: 20 mA max.	20 mA max.	25 mA max.	20 mA max.	
		Receiver: 15 mA max.				
Operating temperature/humidity		-25°C to +55°C (no freezing)/35 to 85%RH (no condensation)				
Operating illuminance		Sunlight: 10000 lx or less, high-frequency lamp: 3000 lx or less				
Vibration resistance		10 to 55 Hz; double amplitude 1.5 mm; 2 hours in each of the X,Y, and Z directions				
Shock resistance		Approximately 100 G (1000 m/s^2), 3 times in each of the X, Y, and Z directions				
Protection category		IP67				
Material		Housing: ABS Front cover: PMMA				
Weight (excluding cord)		Approximately 10 g				
Included items		Instruction manual(mounting bracket and reflector are not included)				

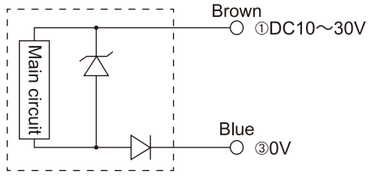
*1 When using reflector V-61 (optional)
*2 When using 200 x 200 mm square of white paper
*3 When using 100 x 100 mm square of white paper

Circuit diagram

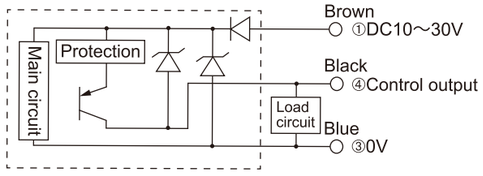
NPN type



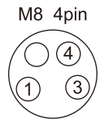
Through beam emitter



PNP type



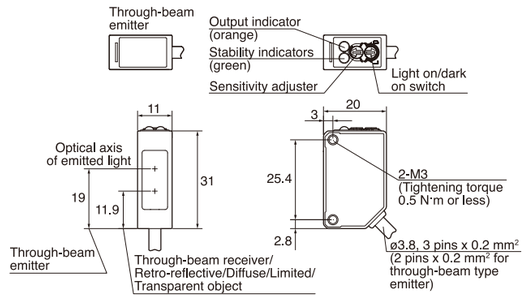
Connector pin No.



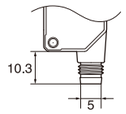
① • • • DC10~30V
③ • • • 0V
④ • • • Control output

Dimensions

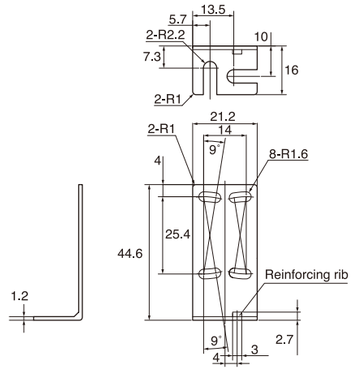
Cable type



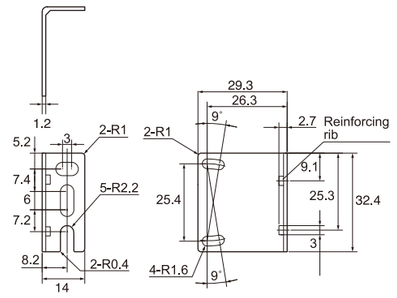
Connector type



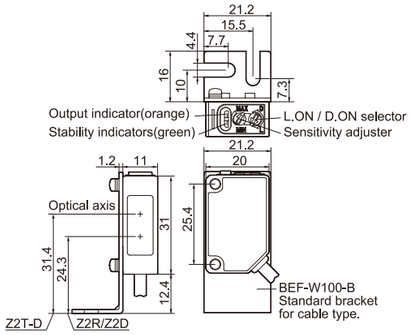
Mounting bracket BEF-W100-B For cable type



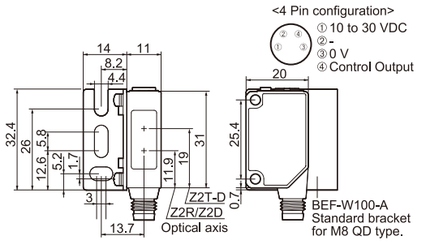
Mounting bracket BEF-W100-A For connector type



Cable type with mounting bracket

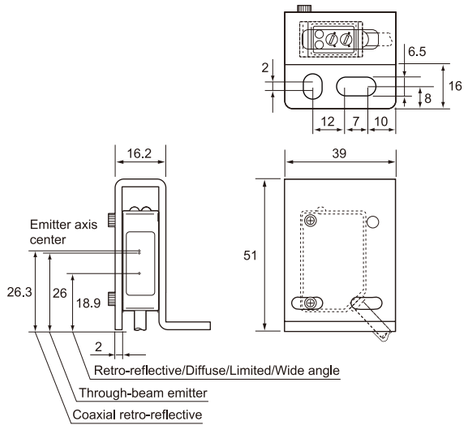


Connector type with mounting bracket

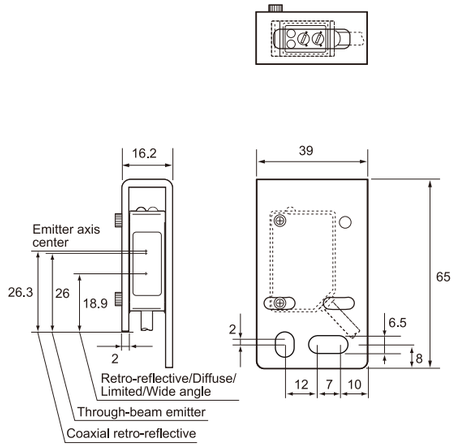


Dimensions

Cable type with protective bracket LK-S01 (only for cable type)

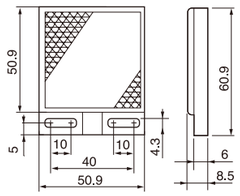


Cable type with protective bracket LK-S02 (only for cable type)

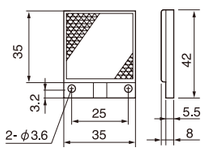


Reflectors for LED Type

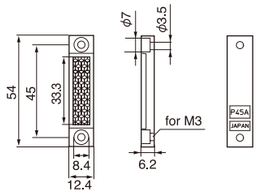
Standard reflector V-61 (optional)



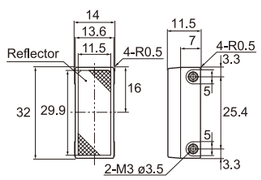
Small reflector V-42 (optional)



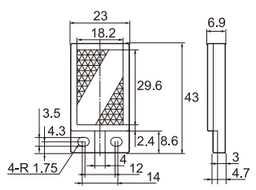
Tiny reflector P45A (optional)



Ultra-compact reflector P25 (optional)



Ultra-compact reflector V-30 (optional)



Optional Products

All optional products are sold separately.
Select appropriate options based on sensing distance and installation requirements.

Reflector (required for retro-reflective type)

Standard
V-61
60.9 x 50.9 mm
Sensing distance:
Z3R-400□, Z3R-Q200□
0.01 to 4 m

Small
V-42
42 x 35 mm
Sensing distance:
Z3R-400□, Z3R-Q200□
0.01 to 2.4 m

Upright
P45A
54 x 12.4 mm
Sensing distance:
Z3R-400□, Z3R-Q200□
0.01 to 1.4 m

Side-mounted
P25
32 x 14 mm
Sensing distance:
Z3R-400□, Z3R-Q200□
0.01 to 1.6 m

Ultra-small
V-30
42 x 23 mm
Sensing distance:
Z3R-400□, Z3R-Q200□
0.01 to 2.2 m

Mounting bracket

For cable type
Floor-mounted
BEF-W100-B

For connector type
Back-mounted
BEF-W100-A
Cannot be used with
JCN-□L connector cables.

Reflective sheet

Diamond grade sheet
100 x 100 mm (adhesive type)
Sensing distance:
Z3R-400□, Z3R-Q200□
0.1 to 1 m

Connector cable (required for connector type)

Straight

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

L-shaped

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

Protective mounting brackets

LK-S01

LK-S02

- Ultra-robust 2 mm thick type
- Stainless steel for good rust resistance

Slit mask for through-beam type (adhesive type)
BL-W100

Shipped as set containing masks with 0.5 mm, 1.0 mm, and 2.0 mm wide slits x 2 each.

Stainless steel slit mask for through-beam type
BL-100-M1
BL-100-M05

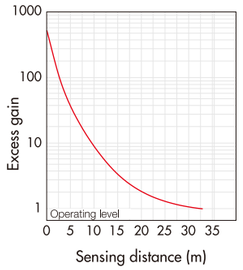
M1 is 1 mm slit, M05 is 0.5 mm slit x 1 each.

Anti-interference filter for through-beam type (set of four)
BL-100-POLF

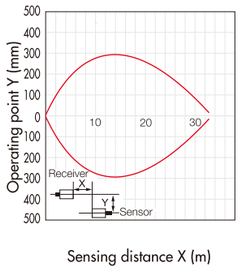
Reference (typical)

Z3T-2500□

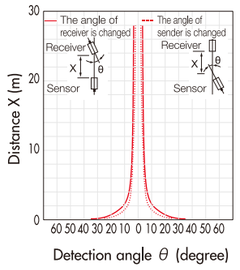
Excess Gain



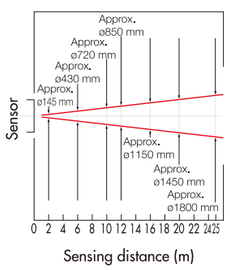
Sensing Area



Angular Deviation

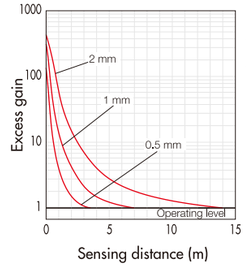


Spot Size

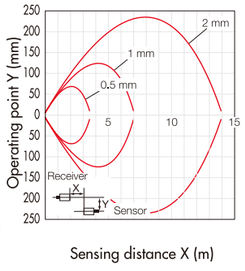


With slit mask attached Z3T-2500□

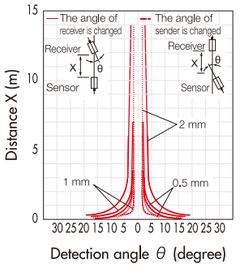
Excess Gain



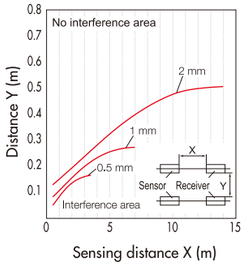
Sensing Area



Angular Deviation

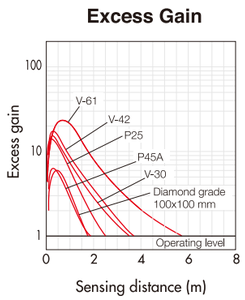


Interference Area

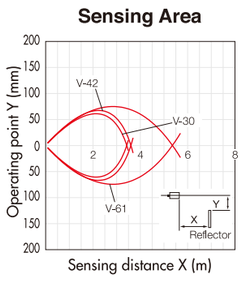


Z3R-400□

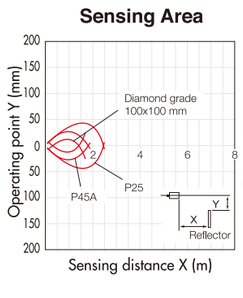
Excess Gain



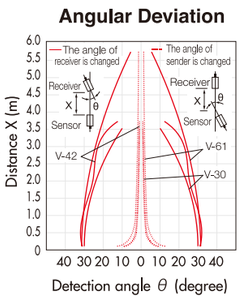
Sensing Area



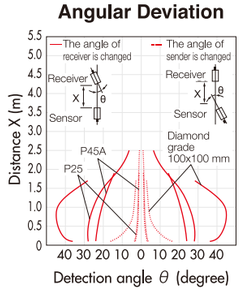
Sensing Area



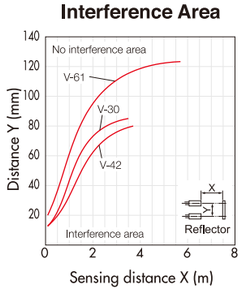
Angular Deviation



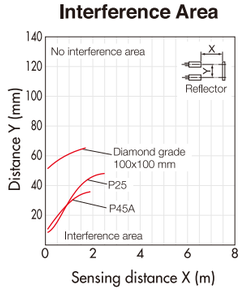
Angular Deviation



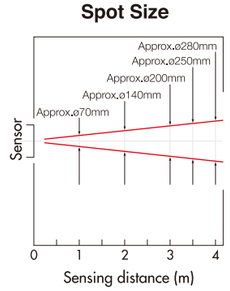
Interference Area



Interference Area

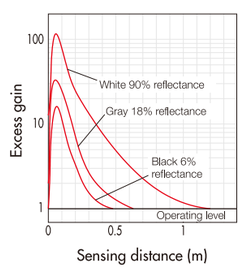


Spot Size

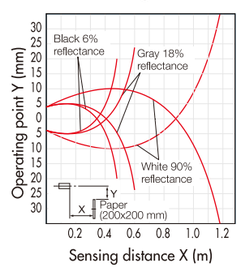


Z3D-100□

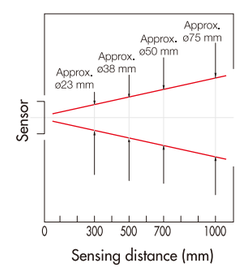
Excess Gain



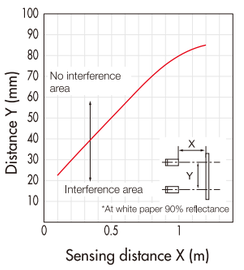
Sensing Area



Spot Size

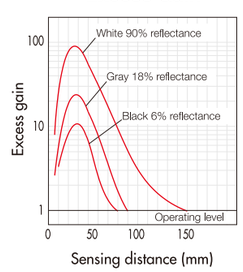


Interference Area

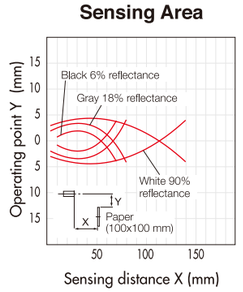


Z3D-L09□

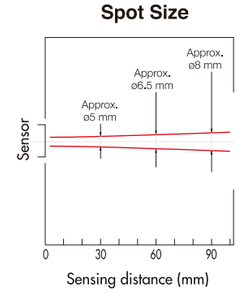
Excess Gain



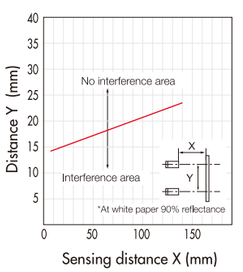
Sensing Area



Spot Size

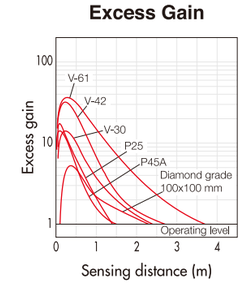


Interference Area

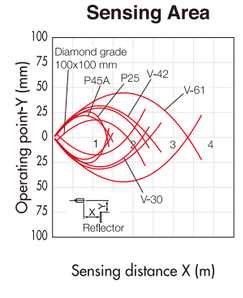


Z3R-Q200□

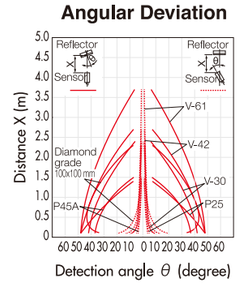
Excess Gain



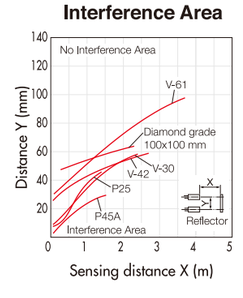
Sensing Area



Angular Deviation



Interference Area



Stainless steel housing type

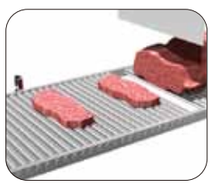
Z-M / BGS-ZM series

- IP69K: Highly water resistant
- Tough structure for food processing line needs washing with high temperature and high pressure water.
- Achieves long sensing distance.
- 8 turn sensitivity adjustment potentiometer (BGS type)

Applications

For production line needs washing

For production line with detergent splash



For meat and fresh food processing line

Product Types

Cable / QD	Output	Diffuse
Distance		0 - 800mm *1
Cable	NPN	ZD-M80N
	PNP	ZD-M80P
M8-QD	NPN	ZD-M80CN
	PNP	ZD-M80CP

Cable / QD	Output	Retro reflective
Distance		0.01 - 5.5m *2
Cable	NPN	ZR-M550N
	PNP	ZR-M550P
M8-QD	NPN	ZR-M550CN
	PNP	ZR-M550CP

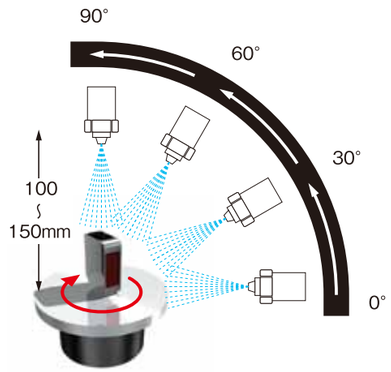
Cable / QD	Output	Through beam
Distance		30m
Cable	NPN	ZT-M3000N
	PNP	ZT-M3000P
M8-QD	NPN	ZT-M3000CN
	PNP	ZT-M3000CP

Cable / QD	Output	BGS	
Distance		10 - 100mm *3	10 - 300mm *3
Cable	NPN	BGS-ZM10N	BGS-ZM30N
	PNP	BGS-ZM10P	BGS-ZM30P
M8-QD	NPN	BGS-ZM10CN	BGS-ZM30CN
	PNP	BGS-ZM10CP	BGS-ZM30CP

* 1 With 200mm x 200mm white paper
* 2 With V-61
* 3 With 100mm x 100mm white paper

IP69K protection

IP69K is an rating of German standard DIN 40050-9 extends the IEC 60529 rating system for high-pressure, hightemperature wash-down applications.



Test condition:
A sensor on the turn table that rotates 5 times per minutes.

Pressure: 80~100bar
Flow rate: 14~16 litre/minute
Temperature: +80°C / -5°C
Distance from nozzle: 100~150mm
Nozzle angle: 0°, 30°, 60°, 90°
Testing period: 30sec per every angle

* IP69K doesn't mean to guarantee that the sensor works under the test condition above. The sensor won't work correctly when the lens gets wet and the light is refracted.

High-pressure, high-temperature, detergent wash-down resistant Tough structure

Top cover : Poly Ether Sulphone (PES)
Oil, detergent, high-temperature resistant.
Top level protection in transparent plastic.

SW, Pot: Poly Ether Etherketone (PEEK)
Shock, scratch, stress, heat resistant.
Highly resistant to chemical except concentrated sulfuric acid.

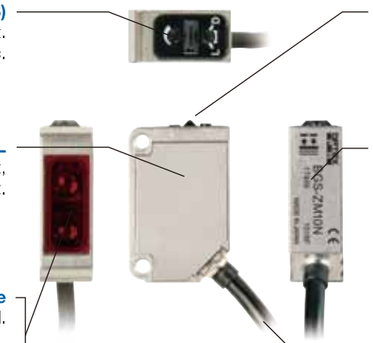
Housing : SUS316L
Highly corrosion-resistant. Detergent, bactericide resistant.

Printing by laser marking
There is no label attached so you don't have to care about interfusion into foods of the label unsticked.

Lens PPSU for thru-beam, diffuse type
Chemical, heat resistant. Very stable material.

Lens PMMA with SiO coating for retro reflective type
Oil, scratch resistant.
Water repellent and anti-static.

Gasket (FKM), cable (PVC)
Chemical, oil resistant and flexible.



Longest sensing distance in the class

High brightness LED by 4 element enables longest sensing distance in the class.

4 element LED (A InGaP-LED)

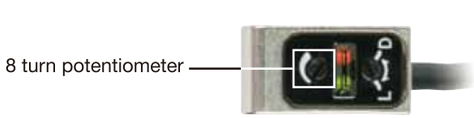
Through beam type
Sensing distance: 30m

Retro reflective type
Sensing distance: 5.5m

Diffuse type
Sensing distance: 80mm

8 turn sensitivity adjustment (BGS Type)

8 turn sensitivity adjustment potentiometer helps easy mounting and easy position adjustment.



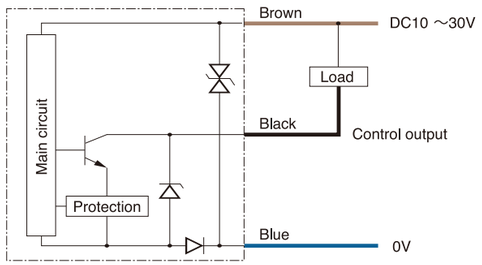
Specifications

Model		Through beam	Retro reflective	Diffuse	BGS	
Cable type	NPN	ZT-M3000N	ZR-M550N	ZD-M80N	BGS-ZM30N	BGS-ZM10N
	PNP	ZT-M3000P	ZR-M550P	ZD-M80P	BGS-ZM30P	BGS-ZM10P
M8	NPN	ZT-M3000CN4	ZR-M550CN4	ZD-M80CN4	BGS-ZM30CN4	BGS-ZM10CN4
connector type	PNP	ZT-M3000CP4	ZR-M550CP4	ZD-M80CP4	BGS-ZM30CP4	BGS-ZM10CP4
M8 (3-pin)	NPN	ZT-M3000CN3	ZR-M550CN3	ZD-M80CN3	BGS-ZM30CN3	BGS-ZM10CN3
connector type	PNP	ZT-M3000CP3	ZR-M550CP3	ZD-M80CP3	BGS-ZM30CP3	BGS-ZM10CP3
M12	NPN	ZT-M3000N-M12	ZR-M550N-M12	ZD-M80N-M12	BGS-ZM30N-M12	BGS-ZM10N-M12
connector type	PNP	ZT-M3000P-M12	ZR-M550P-M12	ZD-M80P-M12	BGS-ZM30P-M12	BGS-ZM10P-M12
Supply voltage		DC10～30V Inc. 10% ripple				
Power consumption		Emittor : 15mA max.	18mA max.		28mA max.	
		Receiver : 15mA max.				
Sensing distance		30m	0.01 - 5.5m (*1)	0 - 800mm (*2)	10 - 300mm (*3)	10 - 100mm (*3)
Adjustable distance		–			20 - 300mm (*3)	20 - 100mm (*3)
Spot size		ϕ1200mm at 30m	ϕ300mm at 5.5m	ϕ40mm at 800mm	ϕ19mm at 250mm	ϕ6mm at 80mm
Response time		500μs				
Hysteresis		–		20% Max	5% Max	3% Max
Operating temp		–25 to +55oC				
Operating humidity		35 to 85%				
Vibration resistance		10～55Hz double amplitude1.5mm X,Y,Z 2hours				
Shock resistance		100G (1000m/s2) X,Y,Z 3times				
Protection category		IEC :IP67 DIN :IP69K	IEC :IP67 DIN :IP69K Reflector is IP67	IEC :IP67 DIN :IP69K		
Light source		4 element red LED				
Indicator		Red LED: output, Green LED: stable, Emitter of thru-beam type doesn't have in dicator			Orange LED: output, Green LED: stable	
Sensitivity adjustment		1 turn potentio meter			8 turn potentiometer	
Operating mode		Light ON/Dark ON selectable by switch				
Control output		NPN (PNP) Open collector, Max.100mA/DC30V				
Cable		Cable length: 2m, ϕ4				
Conformity		CE Feilen Level 3				
Environmental illuminance		Sunlight: 10,000 lux max. Incandescent lamp: 3,000 lux max.				
Material		Housing: SUS316L	Housing: SUS316L	Housing: SUS316L		
		Top cover: PES	Top cover: PES	Top cover: PES		
		Lens: PPSU	Lens: PMMA	Lens: PPSU		
		Switch, Pot: PEEK	Switch, Pot: PEEK	Switch, Pot: PEEK		
		Cable: PVC	Cable: PVC	Cable: PVC		
		Gasket: FKM	Gasket: FKM	Gasket: FKM		
Accessory		Mounting bracket:BEF-W100B	Mounting bracket:BEF-W100B Reflector: V-61	Mounting bracket:BEF-W100B		

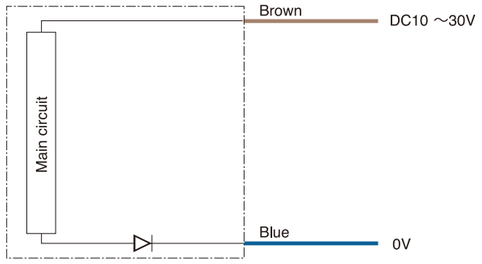
(*1) With V-61
(*2) With 200mm x 200mm white paper
(*3) With 100mm x 100mm white paper

Circuit diagram

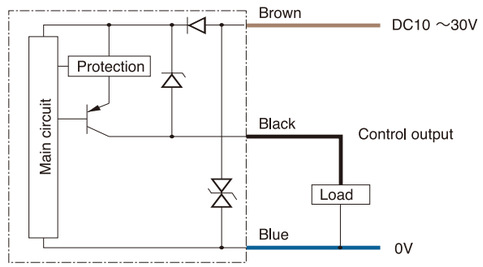
NPN output



Through beam emitter



PNP output

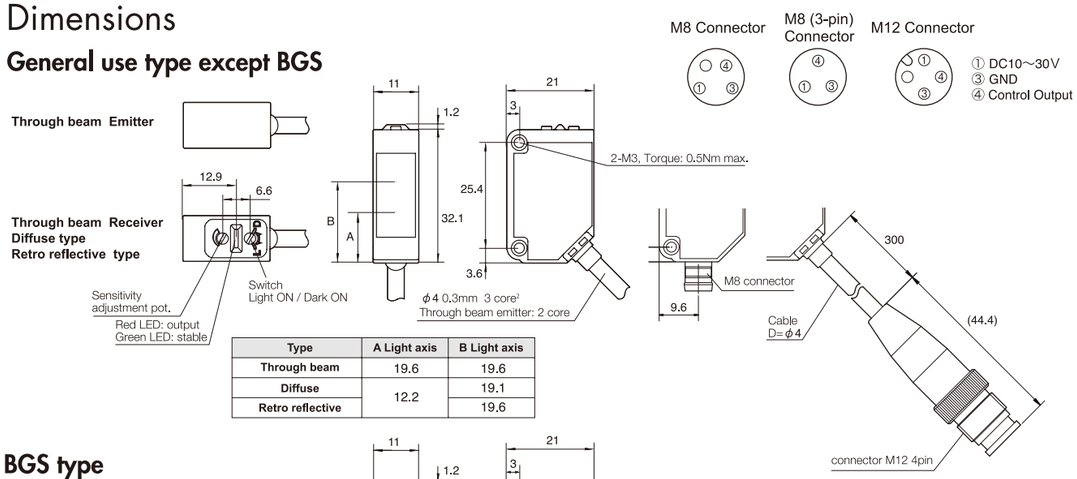


Notes

- When using switching regulator for power supply, please connect frame ground to earth ground.
- Wiring close to high voltage or power line to motors may cause malfunction because of inductive noise. Please wire separated from those lines.
- Please wait around 100msec before use sensor output after power up.

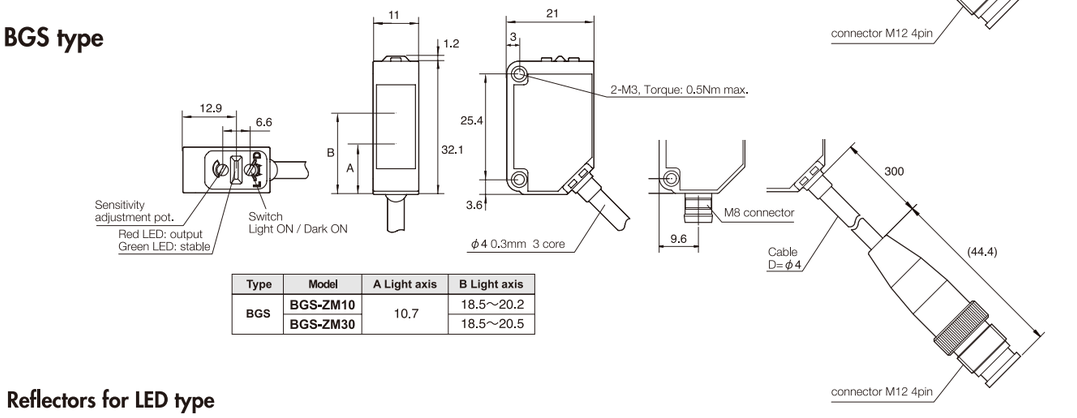
Dimensions

General use type except BGS



Type	A Light axis	B Light axis
Through beam	19.6	19.6
Diffuse	12.2	19.1
Retro reflective		19.6

BGS type

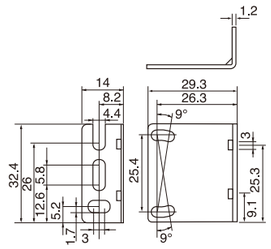


Type	Model	A Light axis	B Light axis
BGS	BGS-ZM10	10.7	18.5～20.2
	BGS-ZM30		18.5～20.5

Reflectors for LED type

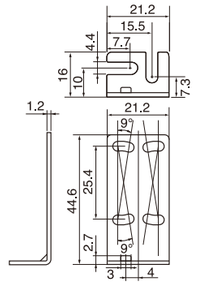
Standard bracket BEF-W100-A

Accessory for M8 QD type sensors

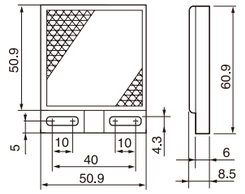


Standard bracket BEF-W100-B

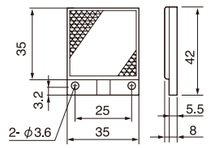
Accessory for cabled type sensors



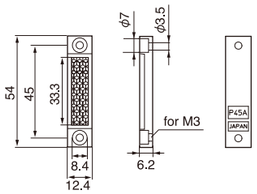
Standard reflector V-61 (Standard, LED type)



Small reflector V-42 (Optional, LED type)

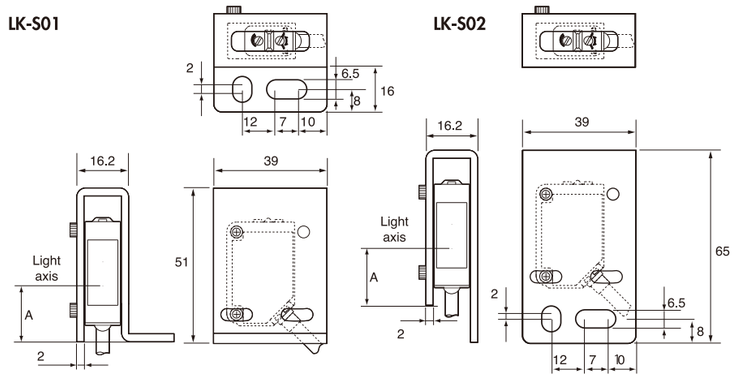


Tiny reflector P45A (Optional, LED type)



Protective mounting bracket

LK-S01



LK-S02

Type	A Light axis
Through beam	26.6
Diffuse Retro reflective	19.2
BGS	17.7

(Unit : mm)

Options

Standard reflector V-61 (Except ZR-QX200)

Small reflector V-42

Tiny reflector P45A

Protective mounting brackets

LK-S01

LK-S02

JCN-S：M8 Straight type

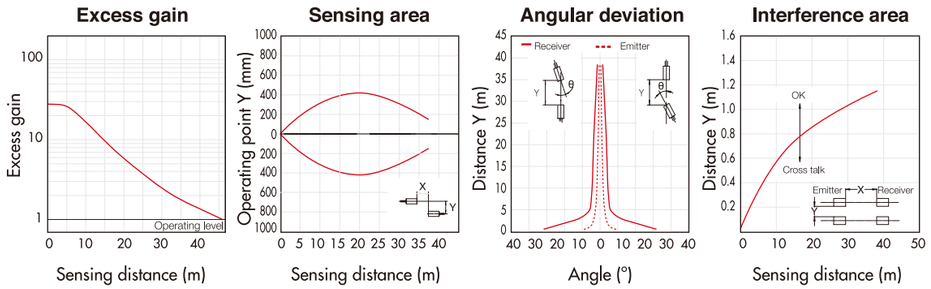
JCN-S : 2 meter
JCN-5S : 5 meter
JCN-10S : 10 meter

JCN-L：L-shape M8 type

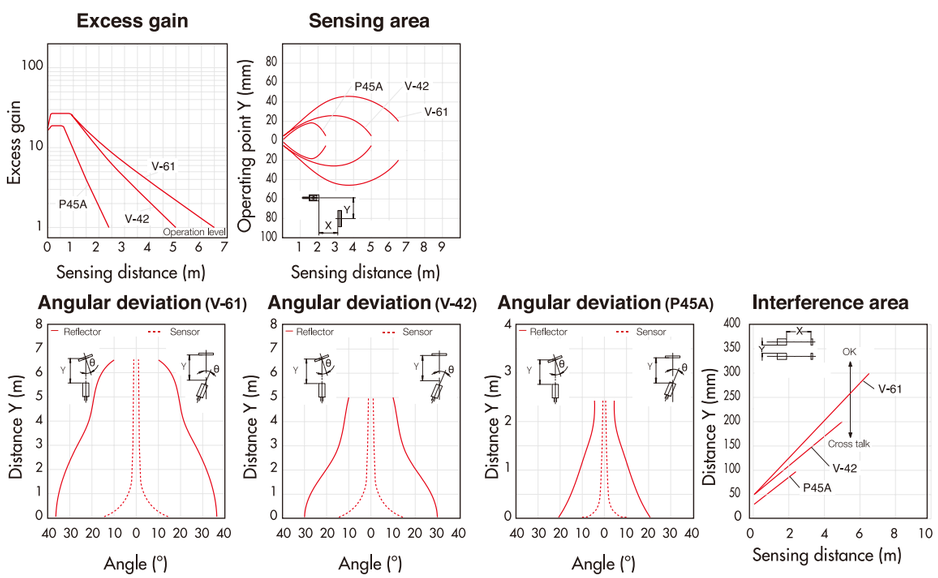
JCN-L : 2 meter
JCN-5L : 5 meter
JCN-10L : 10 meter

Reference (typical)

ZT-M3000N

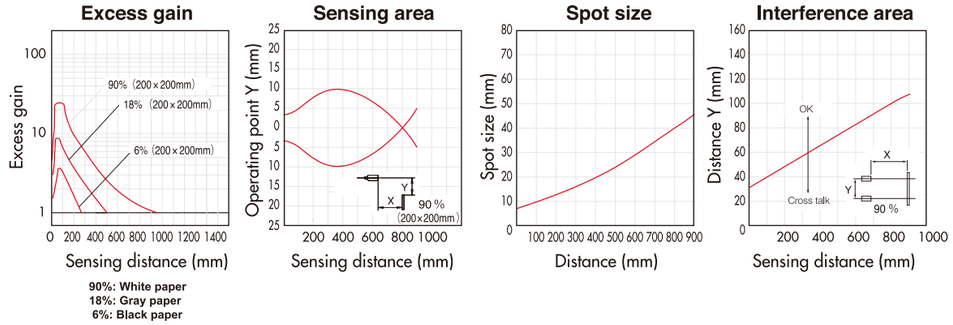


ZR-M550N



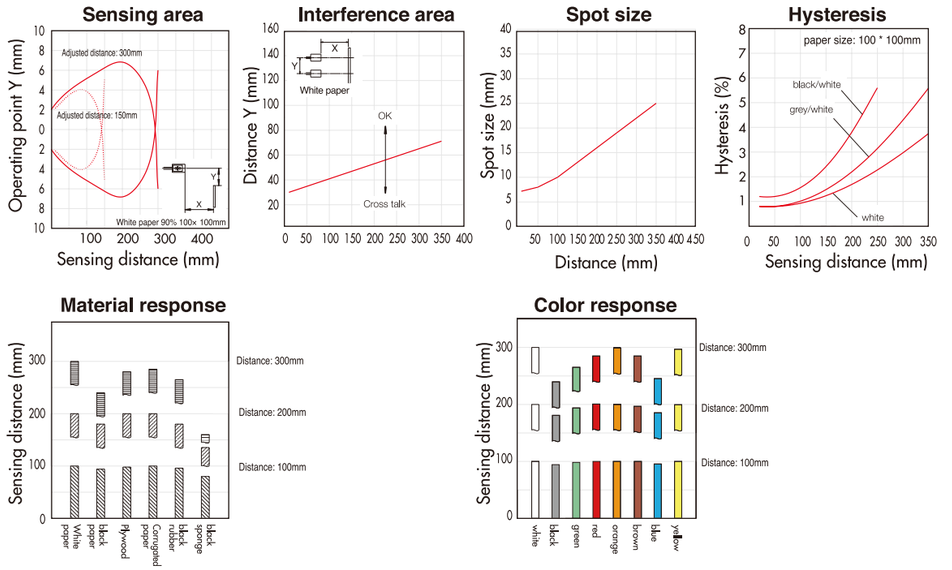
Reference (typical)

ZD-M80N

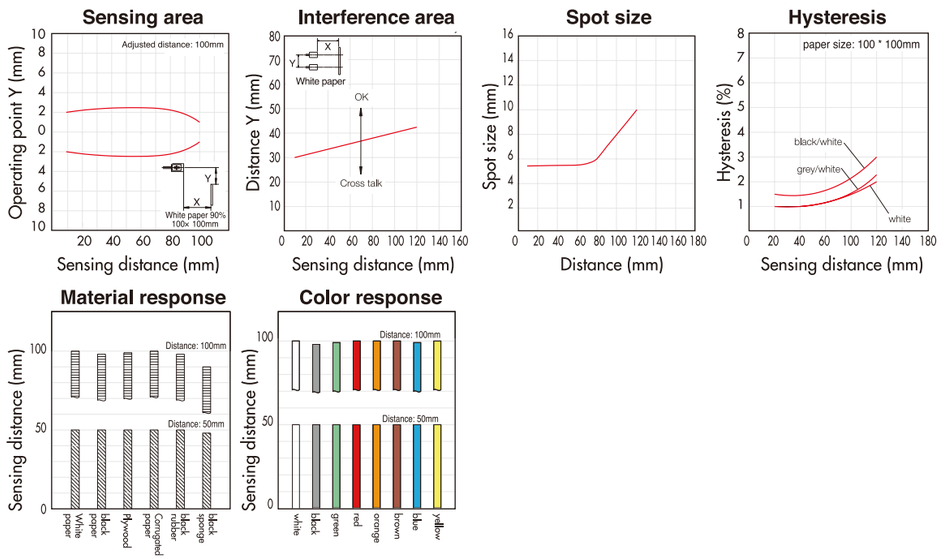


90%: White paper
18%: Gray paper
6%: Black paper

BGS-ZM30N



BGS-ZM10N



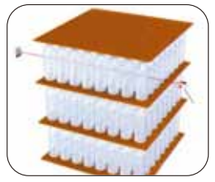
Photoelectric Sensor

K series

- Ideal for the detection of Glass/PET products. (KR-Q50 / KR-Q150 / KR-Q300)
- Test input to verify operation.(KT-700 Thru-beam type)
- IP67 rating, rugged design.

Applications

PET bottles moving on a conveyor



Pallet of PET bottles

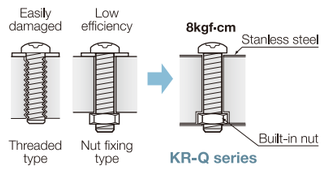
Counting PET bottles

Sensing PET bottles through a narrow opening

Stainless steel housing. Built-in mounting nuts.

The stainless steel housing helps to protect the sensor against mechanical damage if it is struck by passing objects.

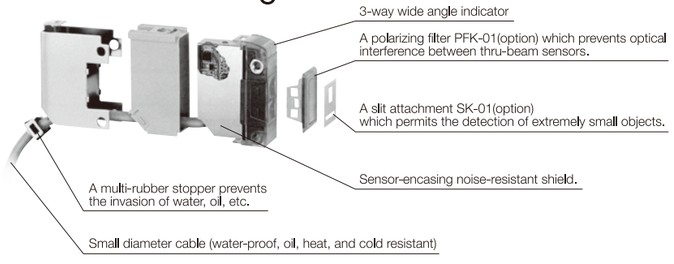
The built-in mounting nuts make installation easy and efficient, the problem of damaged threads due to over-tightening has been eliminated.



Surpasses the VDE standard for electrical noise immunity.

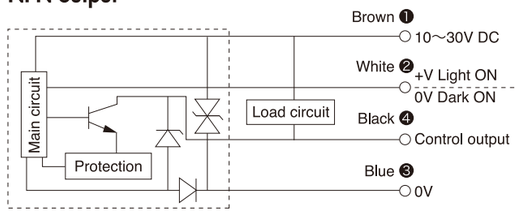
The noise resistant internal circuitry is designed in accordance with the strict VDE standard.
Further, in-house Feilen Noise testing assures high reliability and compliance with international standards.

Case and housing

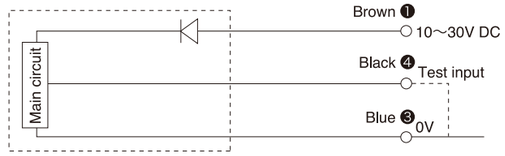


Circuit diagram

NPN output

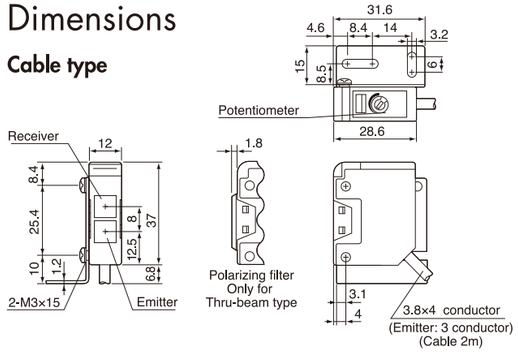


Emitter of Thru-beam type

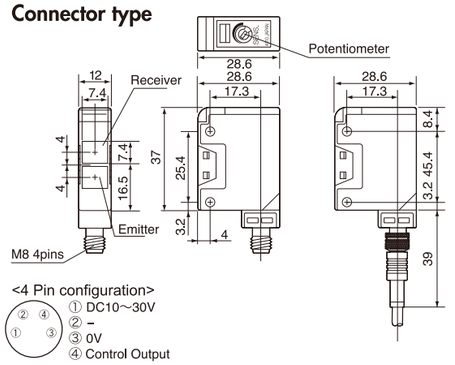


Dimensions

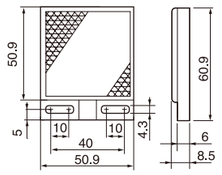
Cable type



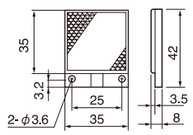
Connector type



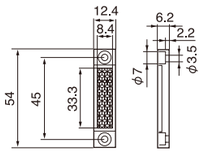
Standard reflector V-61



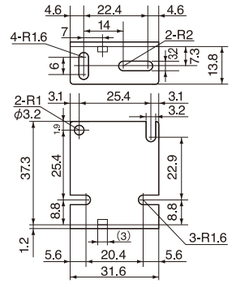
Small reflector V-42



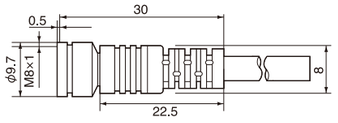
Tiny reflector P45A



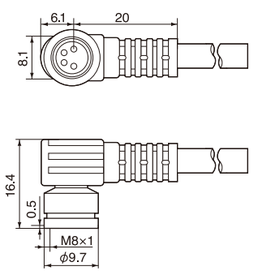
BEF-W170



JCN-S : M8 Straight type



JCN-L : M8 L-shape type



(Unit : mm)

Specifications

Model		Thru-beam	Retro-reflective with polarizing Filter	Diffuse reflective	Convergent	Glass sensing			
Cable type	NPN	KT-700N	KR-250N	KD-40N	KD-L09N	KR-Q50N	KR-Q50NW	KR-Q150NW	KR-Q300NW
	PNP	KT-700P	KR-250P	KD-40P	KD-L09P	KR-Q50P	KR-Q50PW	KR-Q150PW	KR-Q300PW
Connector type	NPN	KT-700CN	KR-250CN	KD-40CN	KD-L09CN	KR-Q50CN	KR-Q50CNW	KR-Q150CNW	KR-Q300CNW
	PNP	KT-700CP	KR-250CP	KD-40CP	KD-L09CP	KR-Q50CP	KR-Q50CPW	KR-Q150CPW	KR-Q300CPW
Sensing distance		7 m	2.5 m	40 cm	1 - 9 cm	50 cm		1.5 m	2.5 m
Light source		Red							
Min detectable object		ϕ7 mm	ϕ40 mm	—	—	ϕ2.5 mm (Opaque object)	ϕ40 mm (Opaque object)		
Response time		1msec Max	0.7msec Max						
Hysteresis		NIL		20% Max	10% Max	NIL			
Sensitivity adjustment		Not equipped		Single turn potentiometer					
LED Indicator		Single Indicator							
Control output		NPN or PNP Open collector, 100mA Max / 30V DC							
Test input		Equipped	Not equipped						
Operating mode		Light ON / Dark ON selectable							
Insulation resistance		Min. 20 M Ohm / DC500V							
Supply voltage		10 to 30 V DC including 10% of ripple							
Power consumption		35mA Max	30mA Max						
Conformity		JIS, UL, CE, VDE							
Operating temp / humidity		−25 to +55°C / 35 to 85%RH							
Environmental illuminance		Sun Light:20,000 lux max. Incandescent lamp:4,000 lux max.							
Vibration resistance		10 50 55 Hz amplitude 1.5mm, X-Y-Z for 2 hours							
Protection category		IEC 144 IP67, VDE Level 3							
Material		ABS (Case), PC (Lens), SUS304 (Cover)							
Weight (Net)		25g (20g for emitter of thru-beam type)				25g			

Options

Standard reflector V-61

Small reflector V-42

Tiny reflector P45A

JCN-S : M8 Straight type

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

JCN-L : L-shape M8 type

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

Protective mounting brackets

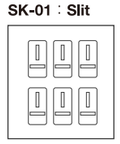
LK-S01

LK-S02

Sensor stand
PLN-1

Fixture of Reflector
PLN-1M

SK-01 : Slit



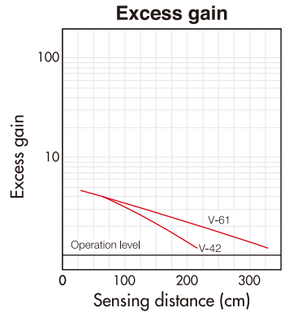
PKF-01 : Filter

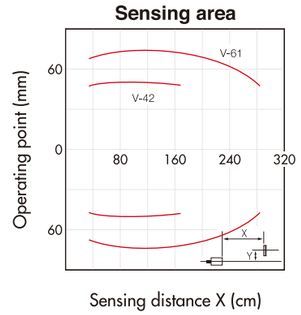
	Slit SK-01 (Emitter + reciever)	Pol.filter PFK-01	Slit + filter
Sensing distance	1000mm	1000mm	500mm
Min.dia	ϕ1mm	ϕ7mm	ϕ1mm

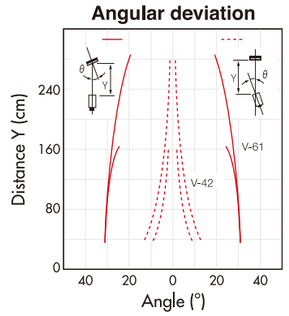
*Just peel the sticker off the backing and apply to the surface of the sensor.

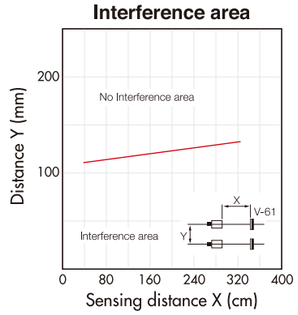
Reference (typical)

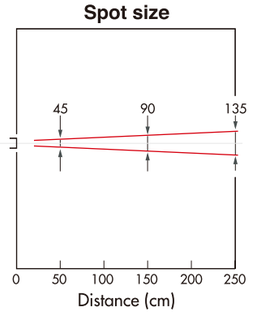
KR-Q300NW



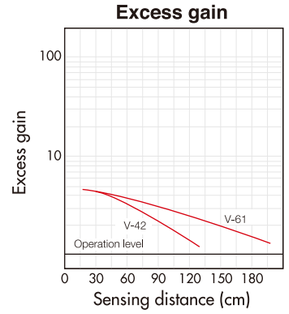


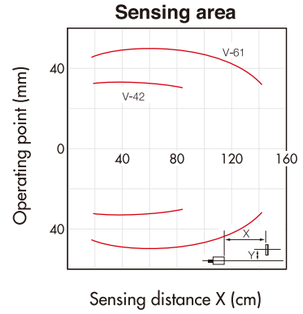


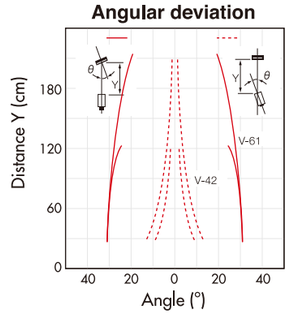


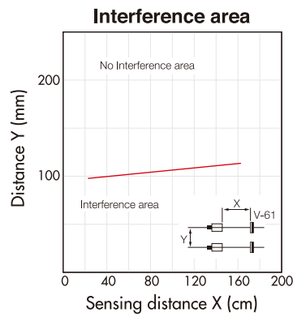


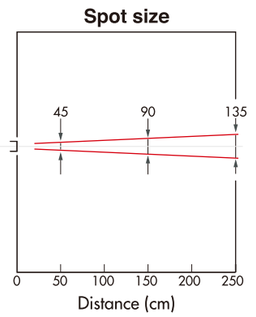
KR-Q150NW





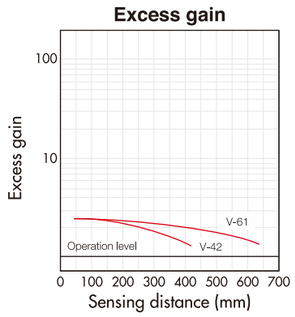


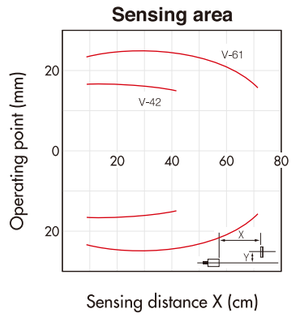


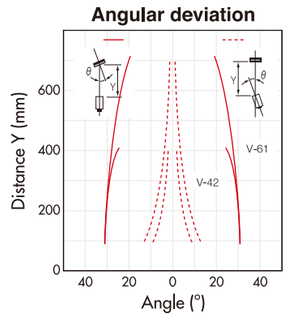


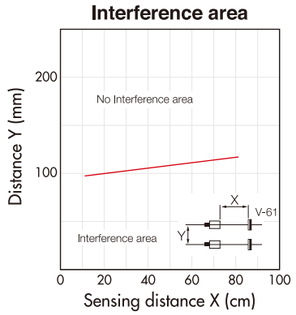
Reference (typical)

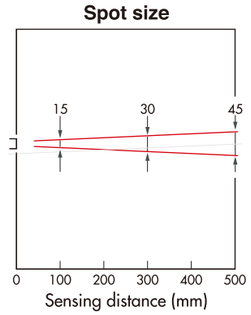
KR-Q50NW



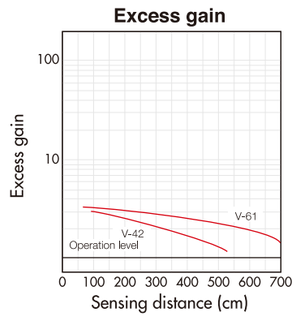


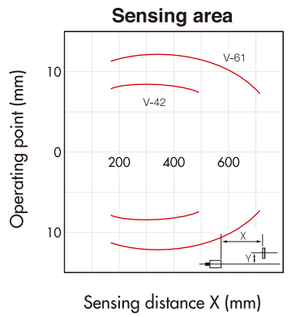


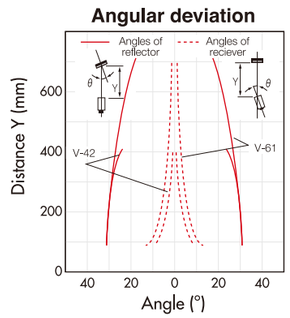


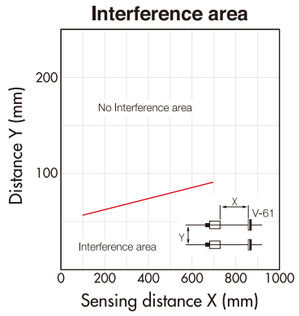


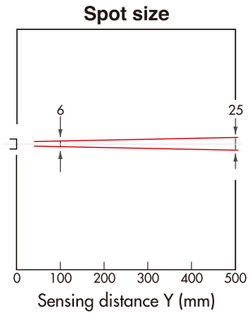
KR-Q50N











Photoelectric Sensor

BGS-2S series

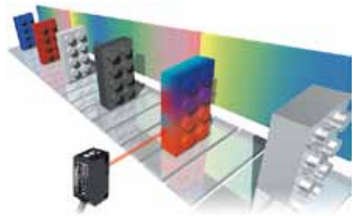
BGS-2S25 Series
- Specially designed for black PC Boards.
- M8 QD types are available.

BGS-2S15 Series
- Noise filter with anti-inverter design. Tolerant to environmental noise.
- Good for any PC Board except black colored.
- Standard BGS in Asia/Japan.

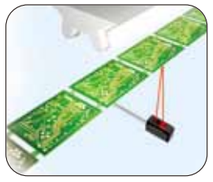
BGS-2S10 series
- For limited area. Good repeatability.

Applications

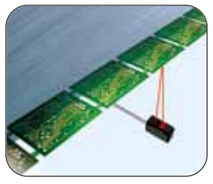
BGS type sensors are designed to detect any target regardless of the color and/or background.



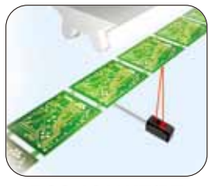
BGS-2S25N/P for black PC Boards



BGS-2S15N/P anti-inverter noise



BGS-2S10N/P for limited mounting space

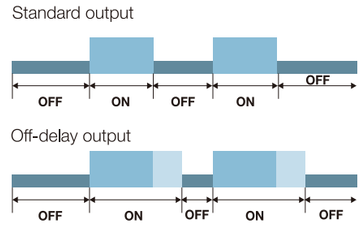


BGS-2S30NT/PT for longer distance. Timer type (0-100msec)

OFF delay timer (BGS-2S30T)

The BGS-2S30NT(PT) has a built-in Off-delay timer, 0 ~ 100 msec.

Timer ▶

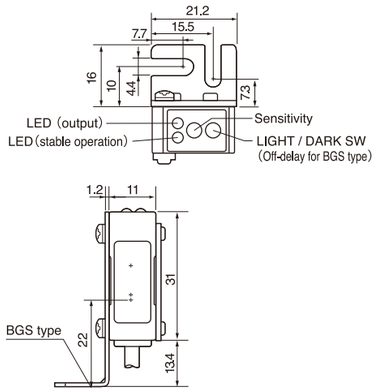


IP67.

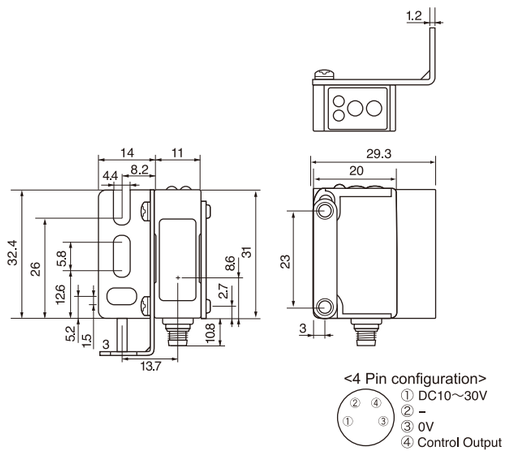
The one-shot molded housing results in an IP67 rating.

Dimensions (BGS-2S15,BGS-2S10,BGS-2S25,BGS-2S30)

Cable type (With bracket BEF-W140-B)



Connector type (With bracket BEF-W140-A)



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

(Unit : mm)

Specifications

Cable type		BGS-2S25N / BGS-2S25P	BGS-2S15N / BGS-2S15P	BGS-2S30N / BGS-2S30P	BGS-2S10N / BGS-2S10P	BGS-2S30NT / BGS-S30PT
Connector type		BGS-2S25CN / BGS-2S25CP	BGS-2S15CN / BGS-2S15CP	BGS-2S30CN / BGS-2S30CP	BGS-2S10CN / BGS-2S10CP	
Sensing distance	white	1 - 250mm	25 - 150mm	5 - 300mm	40 - 100mm	5 - 300mm
	grey	2 - 250mm	25 - 150mm	10 - 300mm	40 - 100mm	10 - 300mm
	black	5 - 200mm	25 - 80mm	15 - 200mm	20 - 70mm	15 - 200mm
Response time		0.5m sec Max				
Repeatability	parallel	2.0mm	1.5mm	2.5mm	1.5mm	2.5mm
	vertical	0.5mm	0.3mm	0.6mm	0.3mm	0.6mm
Operating mode		Light On, Dark On selectable				
Hysteresis		10% Max				
LED Indicator		Two - way, Green (Stable), Yellow (output)				
Light source		Red LED				
Supply voltage		DC10 - 30V incl. 10% ripple				
Conformity		JIS / C4525, CE, UL				
Power consumption		30mA Max				
Sensitivity adjustment		6 - turn trimmer				
Protection category		IEC, IP67				
Shock resistance		50G, XYZ directions				
Materials		PBT with glass (Case), PC(Lens)				
Timer		N / A		Available as option	N / A	

Options

JCN-S : M8 Straight type

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

JCN-L : M8 L-shape type

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

Protective mounting brackets
LS2-S01

Sensor stand
PLN-1

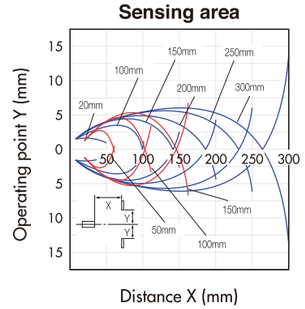
Fixture of Reflector
PLN-1M

Reference (typical)

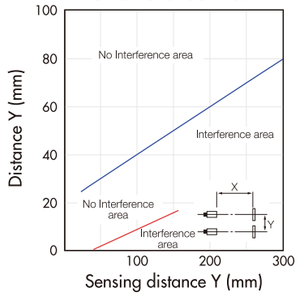
BGS-2S15N
BGS-2S30NT

BGS-2S15N
BGS-2S30NT

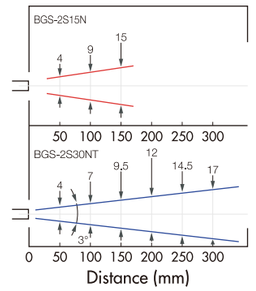
Sensing area



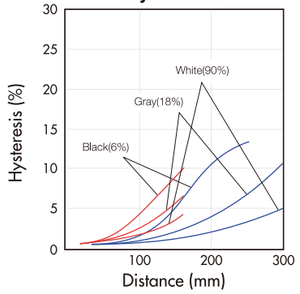
Interference area



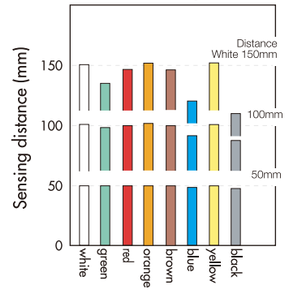
Spot size



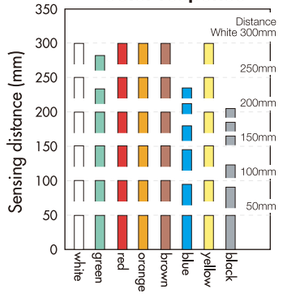
Hysteresis



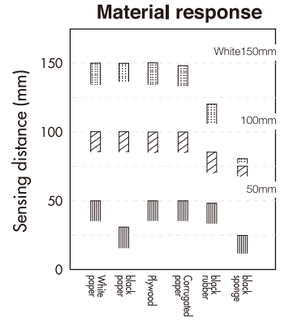
Color response



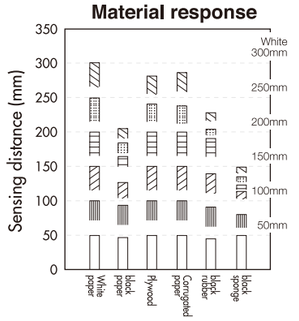
Color response



Material response



Material response

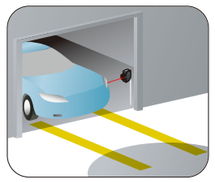


Photoelectric Sensor

Y series

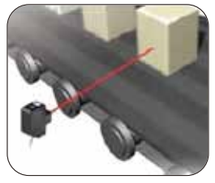
- Complete selection of sensing types including BGS and Transparent Object Detection.
- M18 Threaded Front Mounting.
- Stable Sensing Even For Plastic/Glass.

Applications

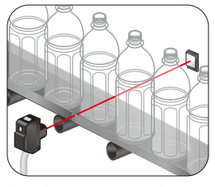


Verifying car position

For Detecting PWB



For Conveyor



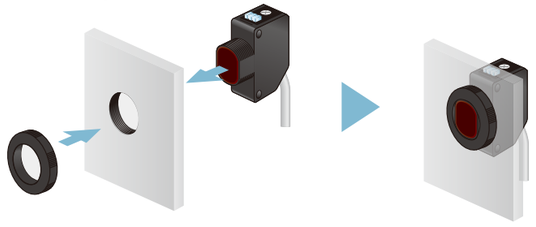
For Beverage industry

Wide Selection

The Y series is offered with seven different models. Thru-beam, Diffuse, Retro-reflective, Transparent object detection, Convergent Beam (two types) and BGS (Background suppression). There is a model for use in almost any application.

M18 Threaded Front Mounting

The sensor can be easily mounted by inserting into an 18 mm opening. There are also conventional mounting holes in the sensor body for added flexibility.



Pig-tail Connector

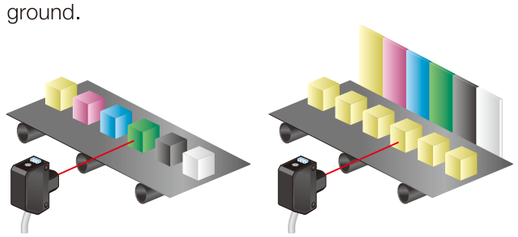
M12 pig-tail type are available for easy maintenance.

Rugged Waterproof Construction

The sensor has an IP67 rating. It is ideal for use in applications where it may be exposed to water spray.

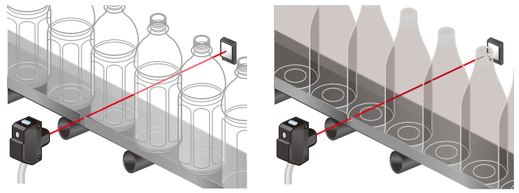
BGS Sensing

BGS (Background Suppression) sensors are not influenced by the color or texture of the target, the sensor is also able to ignore changes in the back-ground.



Stable Sensing Even For Plastic/Glass

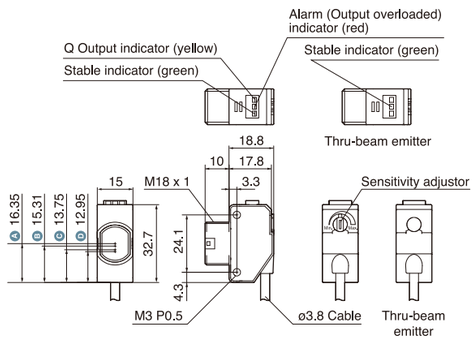
The YR-Q series was designed for the detection of transparent targets.These are ideally suited for clear plastic and glass bottle applications.



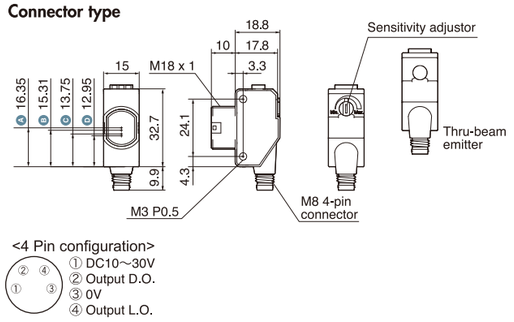
Dimensions

General Use Types except BGS

Cable type

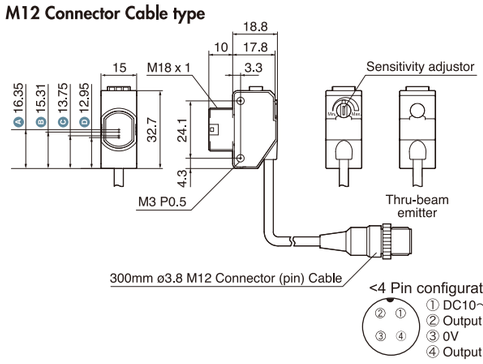


Connector type



<4 Pin configuration>
① DC10～30V
② Output D.O.
③ 0V
④ Output L.O.

M12 Connector Cable type



<4 Pin configuration>
① DC10～30V
② Output D.O.
③ 0V
④ Output L.O.

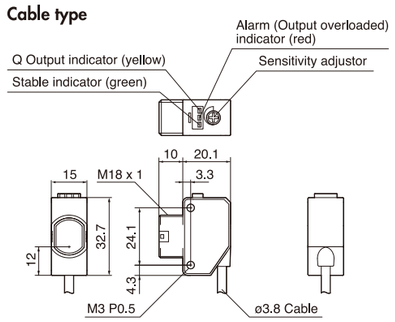
A Thru-beam type
B Convergent Beam short range type
C Convergent Beam standard range type
D Retro-reflective / Diffuse reflective type

(Unit : mm)

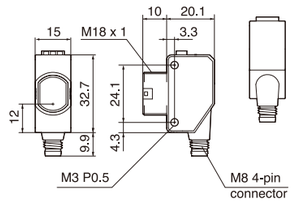
Dimensions

BGS Types

Cable type

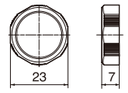


Connector type

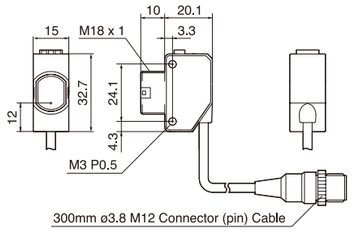


<4 Pin configuration>
① DC10~30V
② Output D.O.
③ 0V
④ Output L.O.

M18 x 1 Nut

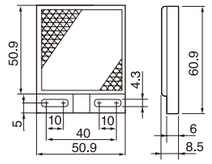


M12 Connector Cable type

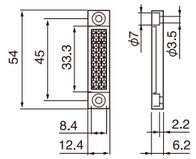


<4 Pin configuration>
① DC10~30V
② Output D.O.
③ 0V
④ Output L.O.

V-61 for YR-140



P45A for YR-Q39



(Unit : mm)

Specifications

Model (NPN / PNP different model)	Thru-Beam	Diffuse reflective	Polarized Retro-reflective	Retro - Glass	Convergent Beam regular focus	BGS
2 meter (approx. 78 inch) cable	YT-1180N / P	YD-15N / P	YR-140N / P	YR-Q39N / P	YD-L2N / P	BGS-Y8N / P
M8 QD	YT-1180CN / CP	YD-15CN / 15CP	YR-140CN / CP	YR-Q39CN / CP	YD-L2CN / CP	BGS-Y8CN / CP
M12 pig-tail	YT-1180N-M12 / P-M12	YD-15N-M12 / P-M12	YR-140N-M12 / P-M12	YR-Q39N-M12 / P-M12	YD-L2N-M12 / P-M12	BGS-Y8N-M12 / P-M12
Sensing distance	30m (1180 inch)	0.4m (15.7 inch)	3.5m (140 inch) V-61 reflector	1m (39.3 inch) P45A reflector	43mm (1.7 inch)	200mm (7.9 inch) Setting range : 30-200mm
Light source	Red LED (visible)					
Hysteresis	N/A	20% max.	N/A	N/A	10% max.	5%
Response time	0.5msec					
LED Indicator	3 Indicators (green indicator only :Emitter of YT-1180) Yellow: output Green: stable Red: alarm - overload					
Operating mode	Light ON and Dark ON outputs provided					
Sensitivity adjustment	1turn potentiometer					4 turn potentiometer
Control output	NPN or PNP open collector, 100mA max. / 30VDC					
Shock resistance	100G , xyz three directions					
Environmental illuminance	Sunlight : 10,000 lux, Incandescent lamp : 3,000 lux max					
Operating temp / humidity	–25°C to 55°C / 35 to 85% RH					
Storage temp / humidity	–40°C to 70°C / 35 to 90 % RH					
Supply voltage	10 - 30VDC incl. 10% ripple					
Power consumption	emitter : 15mA max. 30mA max.					
	receiver : 20mA max.					
Conformity	CE , JIS/C4525					
Circuit protection	Reverse polarity, transient voltages,Output overcurrent					
Material	ABS with 20% glass (case), PMMA (lens)					
Protection category	IEC 144, IP67					

Options

V-61 for YR-140

P45A for YR-Q39

JCN-S : M8 Straight type

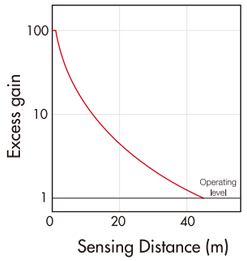
JCN-S : 2 meter
JCN-5S : 5 meter
JCN-10S : 10 meter

JCN-L : M8 L-shape type

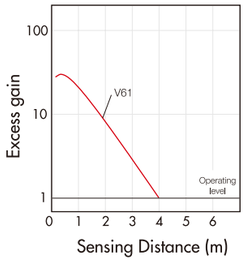
JCN-L : 2 meter
JCN-5L : 5 meter
JCN-10L : 10 meter

Reference (typical)

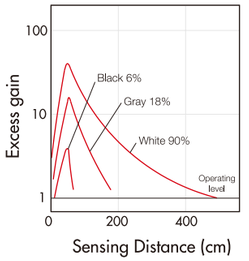
Thru-beam



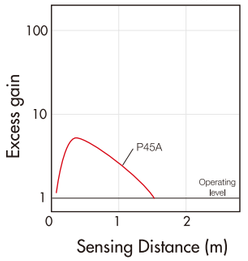
Retro reflective



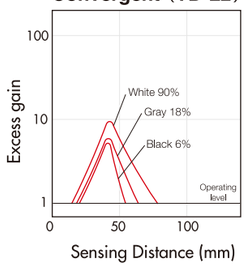
Diffuse reflective



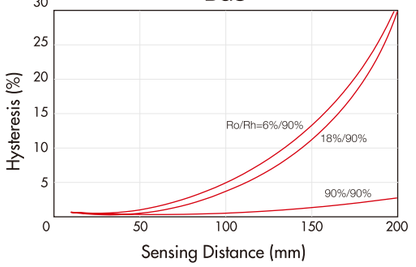
Glass sensing



Convergent (YD-L2)



BGS

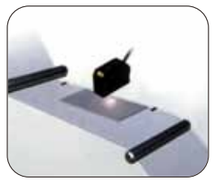


Photoelectric Sensor

DM-18T series

- DM-18T series, RGB sensor with automatic LED selection control.
- Numerical display for easy setting

Applications

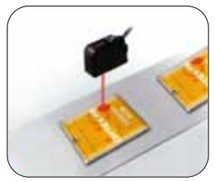


Registration mark on transparent film

Two modes of operation are available, Mark Detection Mode and RGB Color Detection Mode.
The sensor can store up to 8 complete sets of parameters to reduce the setup time when changing products.

Synchronizing sensor for vision sensor CVS

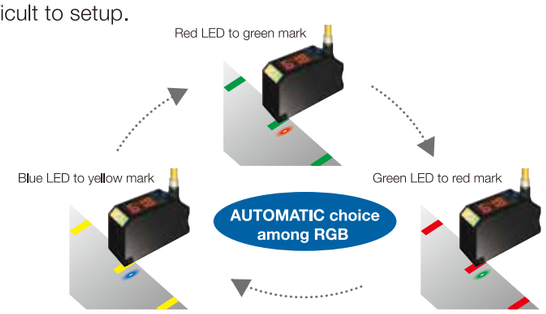
Color mark on laminate tube



Mark on multicolored print

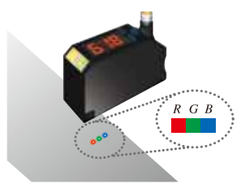
Automatic Choice of RGB light source - Mark Detection mode

The DM-18T has a Red, Green and Blue LED light source built-in, the microcomputer will select the proper one to use according to the specific target color. When initially setting the sensor there is no need to perform this step.
The sensor monitors the contrast between the background and target, it is capable of sensing the difference between colors that used to be difficult to setup.



Color Mode

To select a specific color, a three color (RGB) LED element is used. The sensor computes the color ratio between the three colors. The accuracy of the color detection is assured even with products moving on a conveyor.
One sensor is able to operate in two modes, Mark Detection (Mark Mode) or Color Sensing (Color Mode)



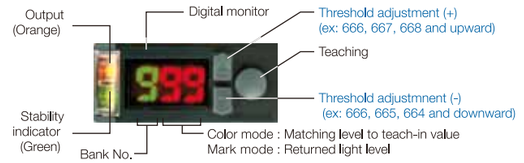
Store up to 8 sets of parameters Color/Mark Sensor

The DM-18T is able to store 8 complete sets of parameters (banks) for quick product changeover. The desired bank can be selected remotely via the three remote inputs.

Bank No.	Wire color		
	Green	Rose	Yellow
1	0	0	0
2	0	0	1
3	0	1	0
4	0	1	1
5	1	0	0
6	1	0	1
7	1	1	0
8	1	1	1

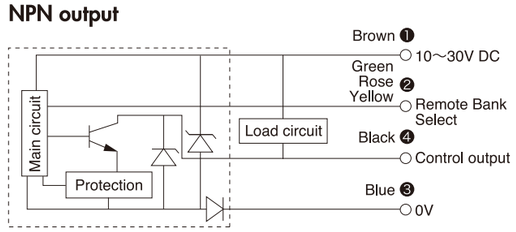
Remarks : 0 = Connect to +V, or leave open
1 = Connect to 0V

Pushbutton Teach with Fine Adjustment

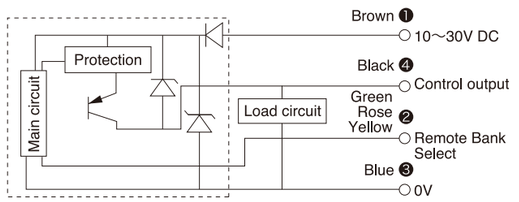


Circuit diagram

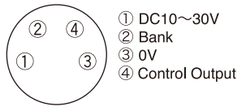
NPN output



PNP output

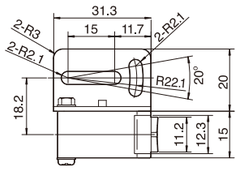


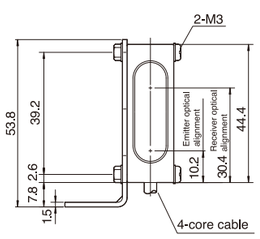
4 Pin configuration

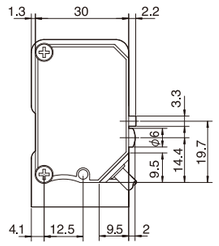


Dimensions

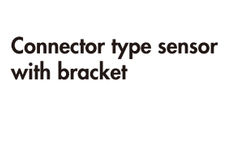
Cable type sensor with bracket

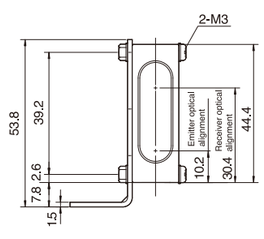


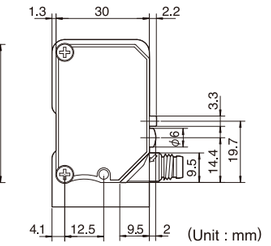




Connector type sensor with bracket







Color response (Color Mode)

Mode : Color mode

:Excellent :Good enough :Good :Impossible

teach color \ measured color		33N (purple)				43N (blue)				47N (light blue)				54N (green)				4N (yellow)				8N (orange)				23N (red)				77N (brown)				88N (black)			
		100	75	50	25	100	75	50	25	100	75	50	25	100	75	50	25	100	75	50	25	100	75	50	25	100	75	50	25	100	75	50	25	100	75	50	25
33N (purple)	100		88	63	34	0	0	0	2	0	0	0	0	0	0	0	3	30	32	38	31	59	57	57	42	67	69	67	47	55	54	38	21	60	58	42	23
	75	90		74	44	1	0	2	12	0	0	0	0	0	0	1	12	32	33	40	41	60	58	58	54	58	66	69	56	56	57	47	32	61	60	54	32
	50	66	77		68	26	21	27	36	0	0	0	22	1	8	21	36	43	45	51	61	45	54	70	71	34	42	76	76	69	68	68	54	75	72	71	54
	25	37	46	70		40	51	55	66	0	0	10	50	22	38	52	66	51	60	65	75	15	25	54	85	4	12	47	88	59	74	84	84	55	67	86	84
43N (blue)	100	0	0	0	0		90	61	18	43	47	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	75	0	0	0	0	88		68	24	52	54	55	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	50	0	0	0	0	67	74		77	0	4	48	68	16	31	47	0	0	0	0	0	0	0	0	0	0	0	0	0	14	33	0	0	22	26	51	0
	25	1	10	34	63	40	49	76		0	1	42	85	37	53	69	80	15	26	44	67	0	0	18	54	0	0	10	52	23	37	61	76	18	32	57	77
47N (light blue)	100	0	0	0	0	47	51	56	28		88	60	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	75	0	0	0	0	51	55	57	40	85		75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	50	0	0	0	0	0	0	34	70	66	79		0	39	56	66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	6	30	0
	25	0	1	24	55	31	42	67	89	0	9	50		45	61	76	86	5	17	35	57	0	0	9	45	0	0	1	43	10	28	51	68	12	20	52	62
54N (green)	100	0	0	0	0	0	0	0	14	36	42	41	34		83	66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	12	0
	75	0	0	0	0	0	0	0	27	32	46	54	48	85		78	0	0	0	0	0	0	0	0	0	0	0	0	0	1	13	0	0	0	1	24	0
	50	0	0	0	9	0	0	1	42	28	41	62	69	62	79		78	0	11	38	66	0	0	0	38	0	0	0	20	0	22	45	54	0	3	35	52
	25	4	13	38	66	18	28	56	80	0	0	38	84	57	69	85		17	29	47	70	0	0	22	58	0	0	14	55	23	40	65	80	23	33	56	80
4N (yellow)	100	30	32	43	51	1	0	10	17	0	0	0	4	0	0	5	17		87	69	47	64	72	72	60	53	60	62	62	74	74	52	35	68	70	57	35
	75	31	34	44	59	1	10	19	26	0	0	0	12	0	2	17	30	88		80	60	52	61	74	71	39	48	63	67	75	75	64	50	71	71	70	48
	50	38	40	51	65	6	17	36	44	0	0	0	29	7	16	33	47	70	82		76	34	46	74	80	24	33	67	75	76	82	80	64	75	78	79	65
	25	34	44	61	76	16	25	53	68	0	0	14	53	27	37	57	68	48	60	78		12	24	52	86	1	11	44	83	51	70	92	87	52	64	89	88
8N (orange)	100	58	61	43	14	0	0	0	0	0	0	0	0	0	0	0	0	62	51	32	12		86	58	23	87	88	66	25	59	40	15	1	60	47	22	1
	75	57	60	53	25	0	0	0	0	0	0	0	0	0	0	0	0	72	62	43	22	89		69	34	78	86	78	36	71	53	26	11	72	56	32	14
	50	57	60	69	54	10	4	12	21	0	0	0	5	0	0	6	22	72	74	74	51	60	70		63	47	57	88	68	96	80	56	42	91	85	61	41
	25	45	55	70	85	26	34	49	57	0	0	2	42	22	27	45	58	57	71	80	87	23	34	63		12	21	55	93	63	80	93	75	65	76	95	76
23N (red)	100	64	56	31	3	0	0	0	0	0	0	0	0	0	0	0	0	54	41	22	1	87	76	47	12		90	56	15	46	30	4	0	54	35	10	0
	75	69	63	41	12	0	0	0	0	0	0	0	0	0	0	0	0	59	49	32	10	88	86	56	22	90		64	24	54	39	16	1	58	47	20	0
	50	67	71	76	45	2	0	3	13	0	0	0	0	0	0	0	14	61	63	65	42	68	78	89	55	56	67		69	86	72	47	31	91	82	52	33
	25	49	58	75	87	26	33	45	53	0	0	0	41	18	25	40	53	61	68	74	83	27	37	66	93	14	25	59		69	86	89	74	64	75	91	72
77N (brown)	100	0	0	0	0	1	1	11	19	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0		79	0	0	85	85	58	0
	75	0	0	0	0	15	16	31	0	0	0	0	27	1	9	26	0	0	0	0	0	0	0	0	0	0	0	0	0	81		0	0	90	94	74	0
	50	40	50	69	84	25	35	54	60	0	0	5	48	32	32	48	63	51	64	80	90	19	28	58	92	7	16	49	89	60	75		82	70	66	95	83
	25	25	34	57	85	23	35	62	78	0	0	20	63	42	50	64	80	38	48	66	88	3	12	42	76	0	0	34	74	44	60	84		52	50	80	97
88N (black)	100	0	0	0	0	10	13	24	35	0	0	0	0	1	9	21	0	0	0	0	0	0	0	0	0	0	0	0	0	85	91	0	0		92	71	0
	75	0	0	0	0	11	8	21	32	0	0	0	0	0	5	15	0	0	0	0	0	0	0	0	0	0	0	0	0	89	92	0	0	80		69	0
	50	0	0	0	0	25	32	48	0	0	0	0	0	24	30	44	0	0	0	0	0	0	0	0	0	0	0	0	0	70	85	0	0	87	77		0
	25	26	35	57	86	25	35	63	78	0	0	20	64	45	52	64	78	37	46	68	88	3	13	43	77	0	1	34	75	41	58	84	97	56	53	78	

n < 80	
80<=n < 85	
85<=n < 90	

"SP"value = Response time	Hysteresis
H1 : 0.8ms	8
H2 : 1.6ms	6

Color response (Mark Mode)

Mode : Mark mode

:Excellent :Impossible

teach color \ measured color		33N (purple)				43N (blue)				47N (light blue)				54N (green)				4N (yellow)				8N (orange)				23N (red)				77N (brown)				88N (black)			
		100	75	50	25	100	75	50	25	100	75	50	25	100	75	50	25	100	75	50	25	100	75	50	25	100	75	50	25	100	75	50	25	100	75	50	25
33N (purple)	100																																				
	75	○																																			
	50	○	○																																		
	25	○	○	○																																	
43N (blue)	100	○	○	○	○																																
	75	○	○	○	○	×																															
	50	○	○	○	○	○	○																														
	25	○	○	○	○	○	○	○																													
47N (light blue)	100	○	○	○	○	○	○	○	○																												
	75	○	○	○	○	○	○	○	○	×																											
	50	○	○	○	○	○	○	○	○	○	○																										
	25	○	○	○	○	○	○	○	○	○	○	○																									
54N (green)	100	○	○	○	○	○	○	○	○	○	○	○	○																								
	75	○	○	○	○	○	○	○	○	○	○	○	○	×																							
	50	○	○	○	○	○	○	○	○	○	○	○	○	○	○																						
	25	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○																					
4N (yellow)	100	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○																				
	75	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	×																			
	50	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○																		
	25	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○																	
8N (orange)	100	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○																
	75	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○															
	50	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○														
	25	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○													
23N (red)	100	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○												
	75	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○											
	50	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○										
	25	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	×	○	○	○							
77N (brown)	100	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○								
	75	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○							
	50	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○						
	25	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○					
88N (black)	100	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○				
	75	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	×			
	50	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○	○	○	○	○		
	25	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

Specifications

Model	Mark / RGB Color type
Cable type	DM-18TN (or 18TP)
M8 connector type	DM-18TCN (or 18TCP)
Sensing distance	18 +/- 2mm
Spot size	1 X 6 mm/18mm
Range adjustment	Teach-in
Supply voltage	DC10-30V including 10% ripple (P-P)
Current consumption	35mA (12V), 25mA (24V)
Response time	Mark mode : H1/250µs, H2/500µs, L/1200µs Color mode : H1/800µs, H2/1600µs, L/4000µs
Timer	Off delay/On delay/One shot delay (10msec increment : 0-990msec, 1sec increment for 1-10 sec)
Light source	RGB LED
LED Indicator	Output indicator (orange), Stable detection (green)
Digital indicator	7 segment, 3 digit Red and Green LED
Control output	NPN or PNP open collector DC30V 100mA max
Operation mode	Light/Dark On selectable
Operating temp / humidity	–25 to 55 °C / 35-95% RH
Insulation resistance	20M Ohm or more (at 500V DC)
Protection category	IP67
Noise resistance	IEC, CE
Shock resistance	50G (500m/S2) , XYZ 3 directions
Environmental illuminance	Sunlight : 10,000 lux, Incandescent lamp : 3,000 lux max
Material	Anti-bacterial ABS (housing), PMMA (lens)

Options

JCN-S : M8 Straight type

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

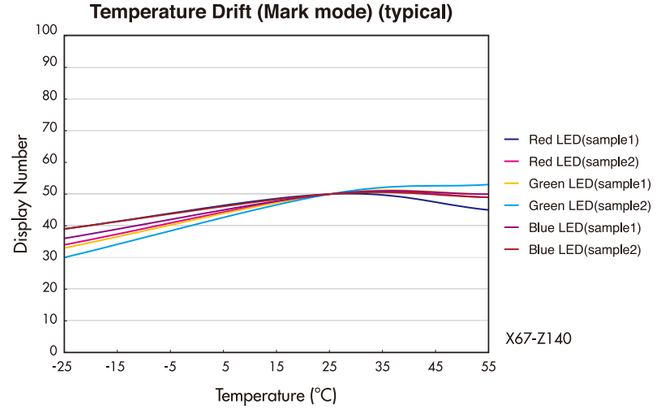
JCN-L : L-shape M8 type

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

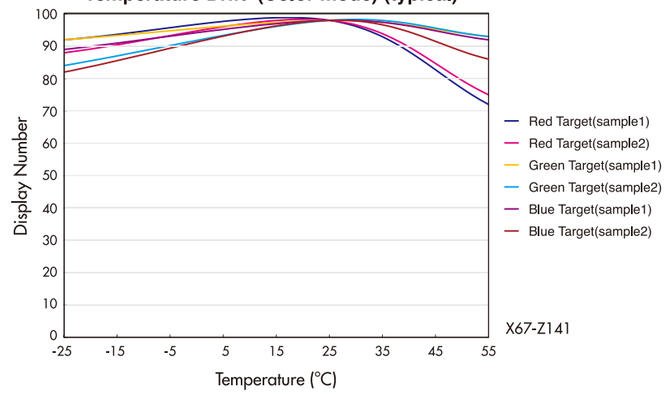
Reference (typical)

DM-18T

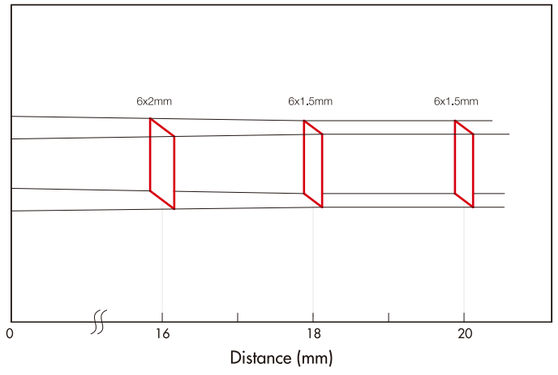
Temperature Drift (Mark mode) (typical)



Temperature Drift (Color mode) (typical)



Spot size



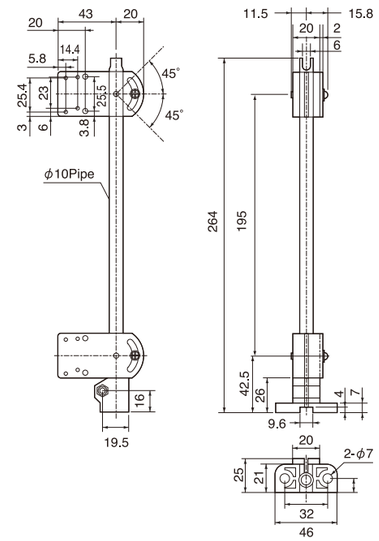
Photoelectric Sensor

Sensor Stand

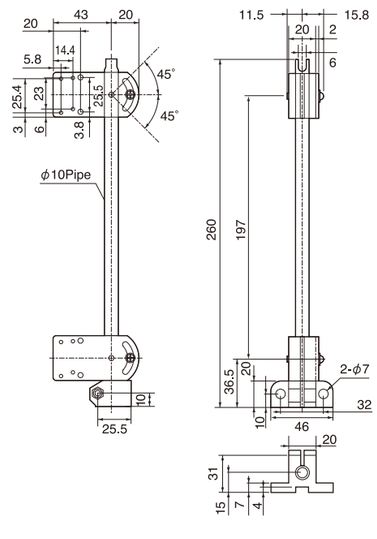
PLN-1 / PLN-1M

Dimensions

PLN-1
(Floor Installation)

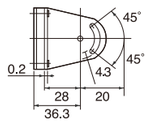


PLN-1
(Wall Installation)



Sensor stand PLN-1 is applicable to: **Z series, J series, S series, K series, J2 series, J3 series, Z-L series, SR-Q series , BGS-Z series, BGS-2S series,Z2 series,ZM series**

PLN-1M
(Fixture of Reflector)



Fixture PLN-1M is applicable to: **V-61 , V-42 and P250F**

LASER SENSOR

LASER SENSOR

A laser light source is ideally suited for BGS sensing, it is also very good for transparent object detection.
This type of sensor offers excellent repeat accuracy and performance.

Compact laser sensor

BGS-HL series

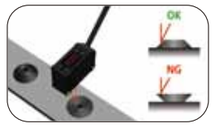
- Minimum detectable height difference = 0.08 mm (BGS-HL05**)
- Built-in controller 4 Digit display
- Stable detection regardless object color

SUS housing

Aluminum housing

Applications

Checking Camshaft position



Checking face of black rubber parts

Detecting wafers piling

Detecting edge of wafer frame

Detecting juice packages with various colors

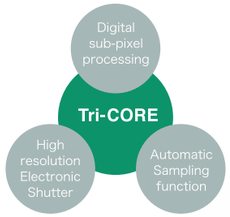
Detecting thin pizza dough

Lineup

Type	Sensing distance	Repeatability	Laser class	Line up	
				Aluminum housing	SUS housing
Cable type	20~50mm	0.01mm	(IEC/JIS) Class1 (FDA) Class Ⅱ	BGS-HL05T	BGS-HLM05T
	50~250mm	0.1mm	(IEC/JIS) Class1 (FDA) Class Ⅱ	BGS-HL25T	BGS-HLM25T
	50~250mm	0.1mm	(IEC/JIS) Class2 (FDA) Class Ⅱ	BGS-HL25T2	BGS-HLM25T2
M8 Connector type	20~50mm	0.01mm	(IEC/JIS) Class1 (FDA) Class Ⅱ	BGS-HL05TC	BGS-HLM05TC
	50~250mm	0.1mm	(IEC/JIS) Class1 (FDA) Class Ⅱ	BGS-HL25TC	BGS-HLM25TC
	50~250mm	0.1mm	(IEC/JIS) Class2 (FDA) Class Ⅱ	BGS-HL25TC2	BGS-HLM25TC2

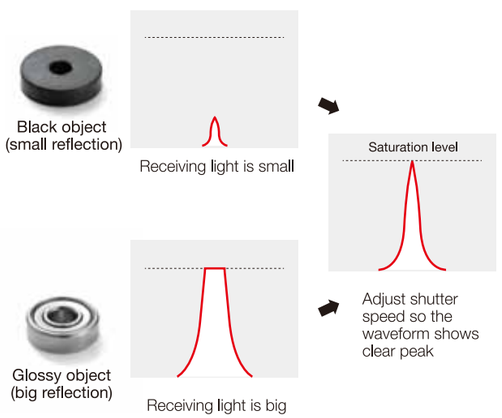
Super precision BGS sensor detects 0.08mm height difference (BGS-HL05**)

FASTUS BGS-HL Series achieves precise height difference detection regardless of Object color and material. This is accomplished by utilizing original “TRI-CORE” Technology found in our high-end displacement sensors. This Technology enables the highest level of performance in the industry at an economical price.



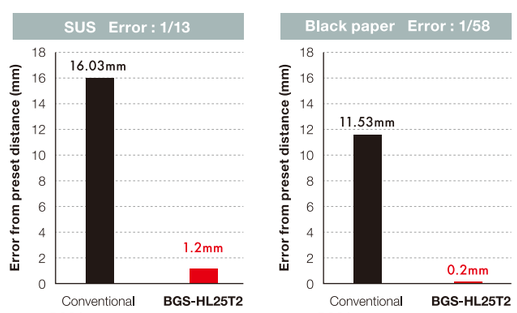
High resolution electronic shutter

Thanks to an automatic shutter speed adjustment function, the BGS-HL series has the advantage of accurately detecting Black non-reflective surfaces as well as shiny reflective surfaces.
The Automatic shutter speed adjustment function minimizes the error caused by differences in reflectivity of object color and material.



Material response is improved incredibly

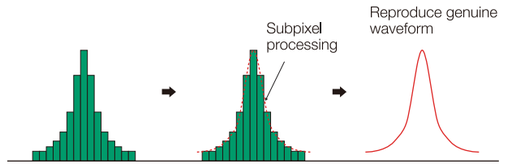
The error of BGS-HL25T2 is improved to 1/13 (SUS) and 1/58 (Black paper) compared with conventional BGS laser sensor.



* White ceramic base at 250mm.

Digital subpixel processing

Subpixel processing divides one pixel into sub pixels and enables accurate detection of peak.

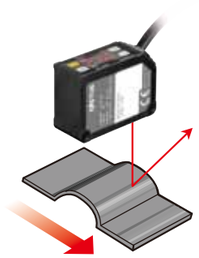


	BGS-HL05	BGS-HL25
Minimum detectable height difference	0.08mm	0.8mm

Condition : Hysteresis setting : 0.02 (BGS-HL05**), 0.2 (BGS-HL25**)
Other condition to be referred notes on the specifications sheet

Automatic sampling function

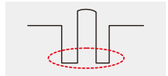
In addition to standard feedback, received light to laser power, BGS-HL has Automatic Sampling function which enables stable detection of metal surface and also black material by adjusting sampling speed.



Sampling speed is fixed

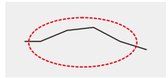
Measurement result

High speed sampling



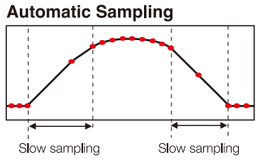
Not enough light partly

Slow sampling



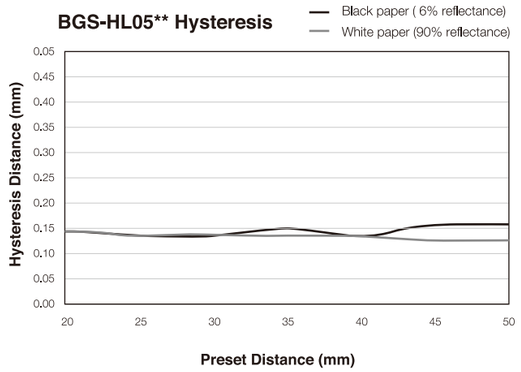
Can't get correct shape

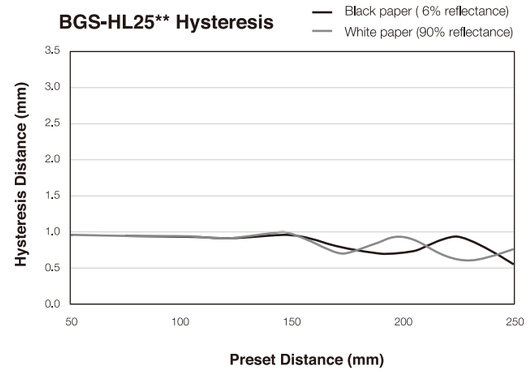
Automatic Sampling



It can get correct shape by changing sampling speed

Hysteresis





The graphs show hysteresis at each sensing distance.
Default hysteresis setup : 0.15mm (BGS-HL05**), 1.0mm (BGS-HL25**)
Hysteresis of Black paper / White paper is small enough to neglect.

Easy to see digital panel

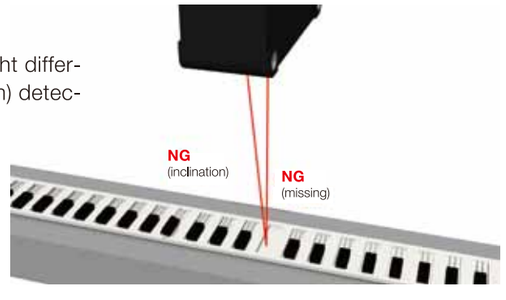
- 4 Digit display in small case
- Easy setup by 4 buttons
- Functions are like high-end

Ideal for robot mounting

Ideal for mounting on robot cylinder thanks to compact dimensions and the light weight. IP67 water tightness is also secured.

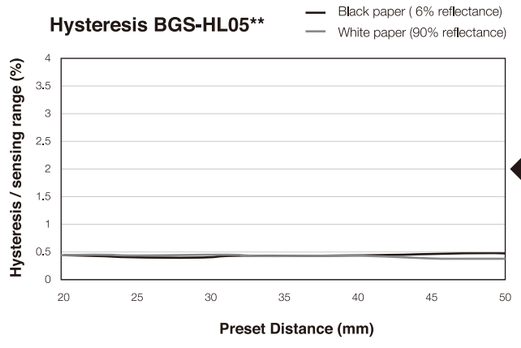
The minimum detectable height difference of 0.08 mm (BGS-HL05**)

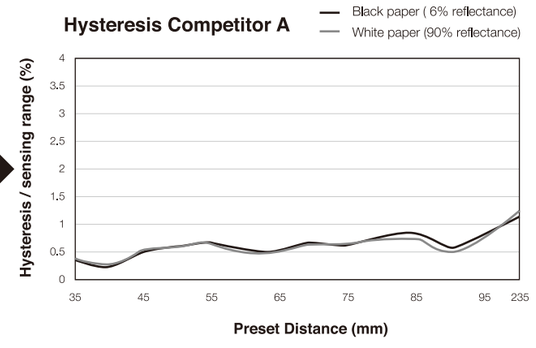
Perfect for applications that require sensing the height difference of very thin parts, inclination, and overlap (seam) detection.

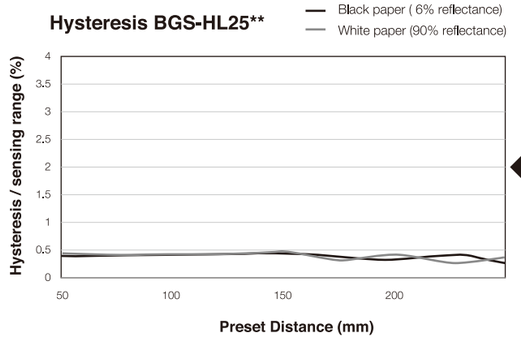


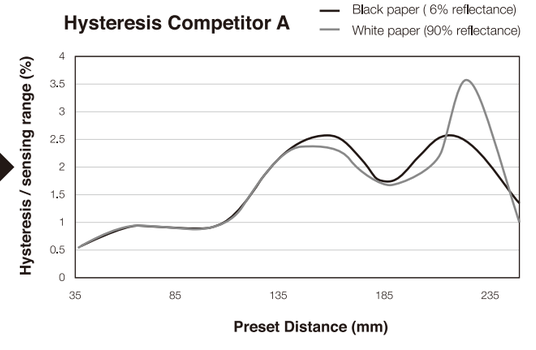
Hysteresis Comparison with Competitor "A"

BGS-HL series is much better than the competitor "A".

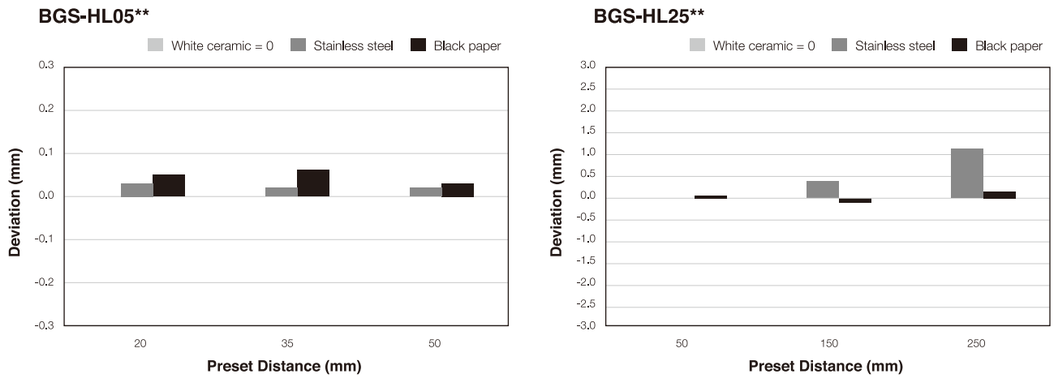






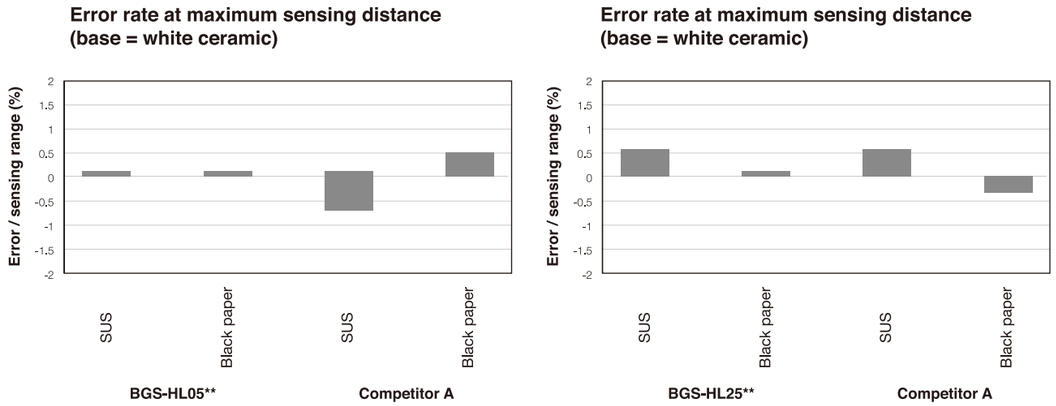


Material response

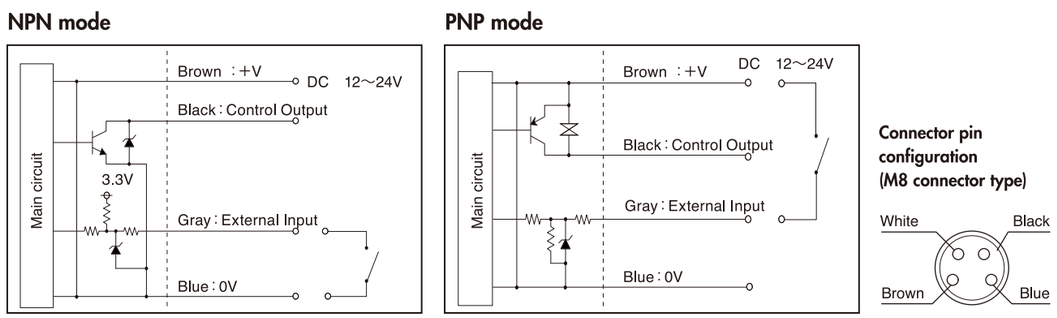


Material response Comparison with Competitor "A"

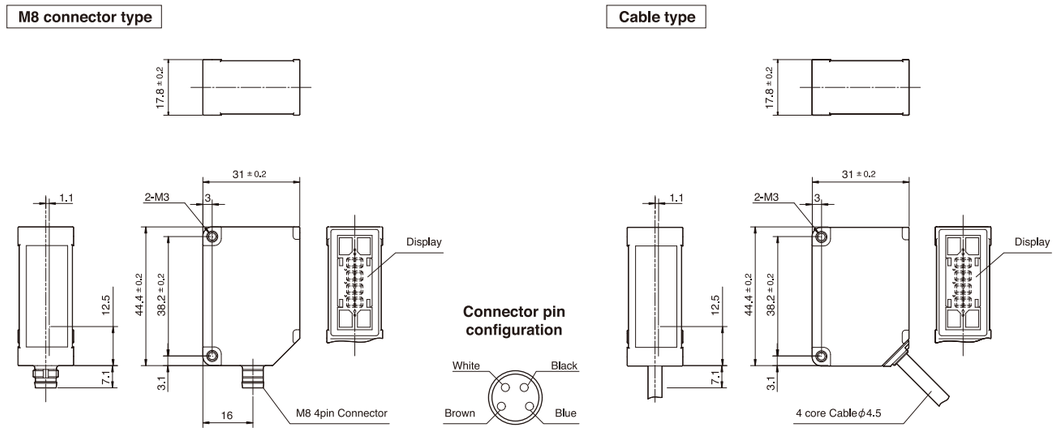
BGS-HL series has smaller error than the competitor “A”.



Circuit diagram



Dimensions



(unit : mm)

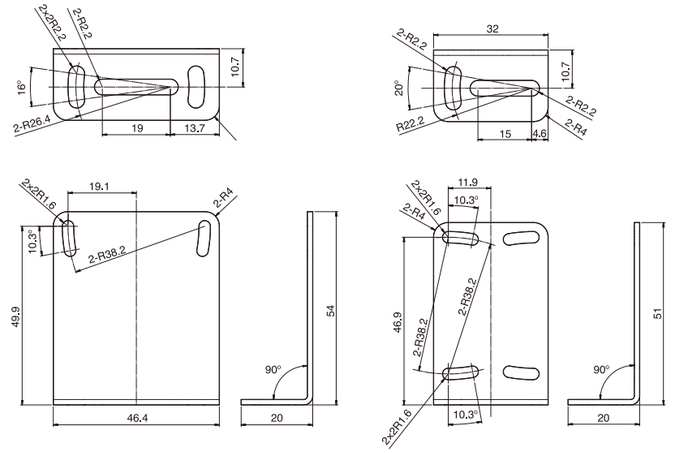
Options

Cable

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

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

Bracket



BEF-OD1-A
(for connector type)

BEF-OD1-B
(for cable type)

(unit : mm)

Specifications

Model	Cable type		BGS-HL05T	BGS-HL25T	BGS-HL25T2
		SUS housing	BGS-HLM05T	BGS-HLM25T	BGS-HLM25T2
	Connector type	Aluminum housing	BGS-HL05TC	BGS-HL25TC	BGS-HL25TC2
		SUS housing	BGS-HLM05TC	BGS-HLM25TC	BGS-HLM25TC2
Sensing distance ※1			20~50mm	50~250mm	
Repeatability ※2			0.01mm	0.1mm	
Minimum detectable height difference ※3			0.08mm	0.8mm	
Light source			Red laser diode (wavelength 655nm)		
			Max. output : 390 μW		Max. output : 1mW
Laser class		IEC / JIS	Class 1		Class 2
		FDA	Class Ⅱ		
Spot size ※4			φ0.8mm	φ1mm	
Response time			Default : 1.5~7.5ms	Default : 3~15ms	
Hysteresis			0~22.49mm (default:0.15mm)	0~149.9mm (default:1mm)	
Indicator			Laser indicator : Green / Output indicator : Orange / Mode indicator : Red		
Digital display			7 segment 4 digit LED display		
Adjusting sensing distance			Teaching / Manual		
External input			Laser OFF, Teaching, Sample & Hold, One shot		
Control output			NPN/PNP max.100mA/DC24V (Residual voltage 1.8 V max.)		
Operating mode			Light ON/Dark ON selectable by setting		
Timer			OFF / On delay / Off delay / One shot (0~9999ms)		
Power supply / Current consumption			DC12~24V including 10% ripple (p-p) / 40mA max.		
Protection circuit			Reverse connection protection, Overcurrent protection		
Protection category			IP67		
Operating Temp. / Humid.			-10 ~ 50°C / 35 ~ 85% RH without freezing or condensation		
Storage Temp. / Humid.			-20 ~ 60°C / 35 ~ 85% RH		
Ambient illuminance			Incandescent lamp: 5,000 lx max.		
Vibration resistance			10 ~ 55Hz, Double amplitude 1.5mm, X,Y,Z for 2 hours		
Shock resistance			500m/s^2 (approx. 50G) X,Y,Z 3 times each		
Material			Case : <Alminum type> Aluminum / <SUS type> SUS, Front lens : PPSU, Display : PET		
Weight			Cable type : Approx. 90g, Connector type : 30g		
Bundled accessories			Mounting bracket : BEF-OD1-B (for cable type) / BEF-OD1-A (for connector type),		
			M3 screw* 2pieces		

The specifications are based on the condition unless otherwise designated: Ambient temperature: 23°C , Supply voltage: 24VDC, Sampling period: 500μs, Averaging: 512, Measuring distance: Center of the range, Testing object: White ceramic

※ 1 Display shows 0.00~30.00 (BGS-HL05**) / 0.0~200.0 (BGS-HL25**).
When “shift function” is ON, display shows 0 at the teaching position.
The display is available to show number in the range as follows.
-7.50~37.5 (BGS-HL05**), -50.0~250.0 (BGS-HL25**)
※ 2 Sampling period : 1000 μs
※ 3 Hysteresis setting : 0.02 (BGS-HL05**), 0.2 (BGS-HL25**)
※ 4 Defined with center strength 1/e2(13.5%) at the center. There may be leak light other than the specified spot size.
The sensor may be affected when there is a highly reflective object close to the detection area.

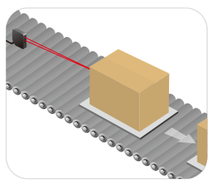
Time of Flight Laser Sensor

TOF series

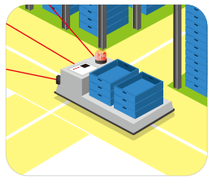
Cable type

- TOF, Time Of Flight, is one of methods to measure the distance by measuring time to the object.
- TOF sensor can measure the distance to the object regardless its color and angle.

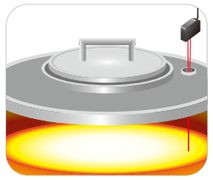
Applications



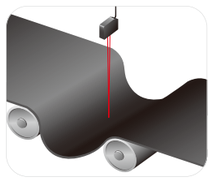
Position detection of items on moving palette.



Position detection of automated guided vehicle.

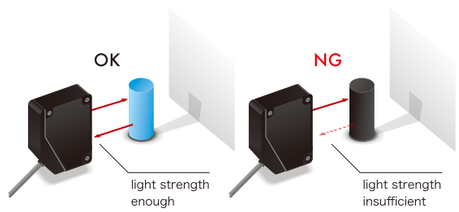


Level detection of melted aluminum liquid.

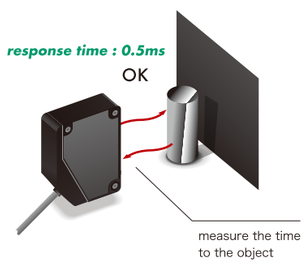


Height control of loosen rubber sheet.

Standard Diffuse reflective sensor



TOF (Time of Flight)

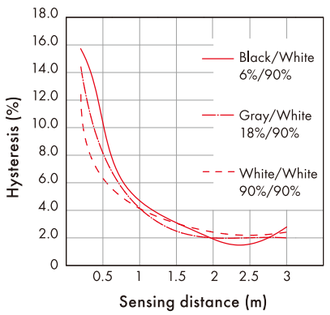


TOF with 2mm resolution

The TOF sensing method provides very accurate sensing that is not affected by background and target color. At a sensing distance of 3meters (black 6%) the repeat accuracy is only 2mm.

Super tight hysteresis

Optex FA's skill in TOF technology design provides super tight hysteresis between black and white objects (2% at a 3 meter distance)

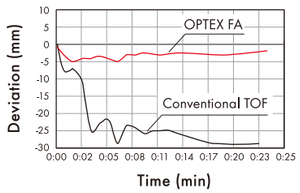


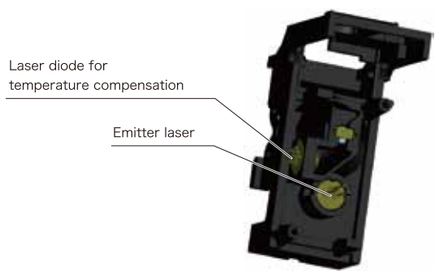
Crosstalk prevention-2pcs MAX.

Up to 2pcs can be mounted side by side

Dual laser system

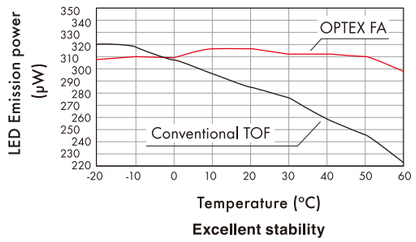
The sensor uses two laser diodes in order to compensate for temperature drift of the laser pulse rise time. One laser diode is inside the case and emits directly to a receiving diode. The other emits on the outside of the case.
By compensating for the time difference between the two laser pulses , the time measurement remains consistent regardless of temperature changes.





World's top stability

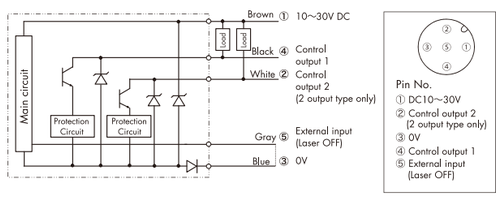
TOF series sensor released by Optex FA maintains emission power without being influenced by temperature increase from continuous use.
World's top stability is achieved.



Excellent stability

2 output type with individual thresholds

It has two potentiometers so the distance threshold for each output can be adjusted individually.

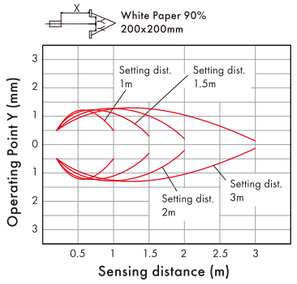


12-turn potentiometer (Retro reflective) for fine adjustment

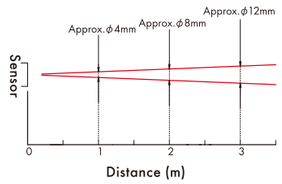
12 turn potentiometer is built-in on Retro Reflective type for precise adjustment.
(4 turn potentiometer on Diffuse reflective type)

Figures

TOF-3V300N(P)

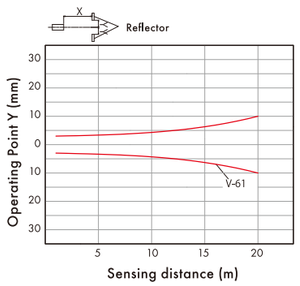


Sensing Area

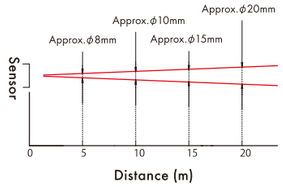


Spot Size

TOF-3V2000N(P)



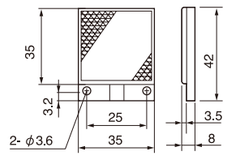
Sensing Area



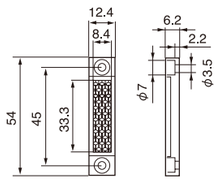
Spot Size

Options

Small reflector V-42

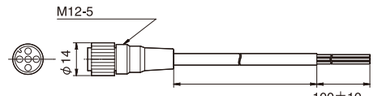


Tiny reflector P45A



Cable for M12 connector type

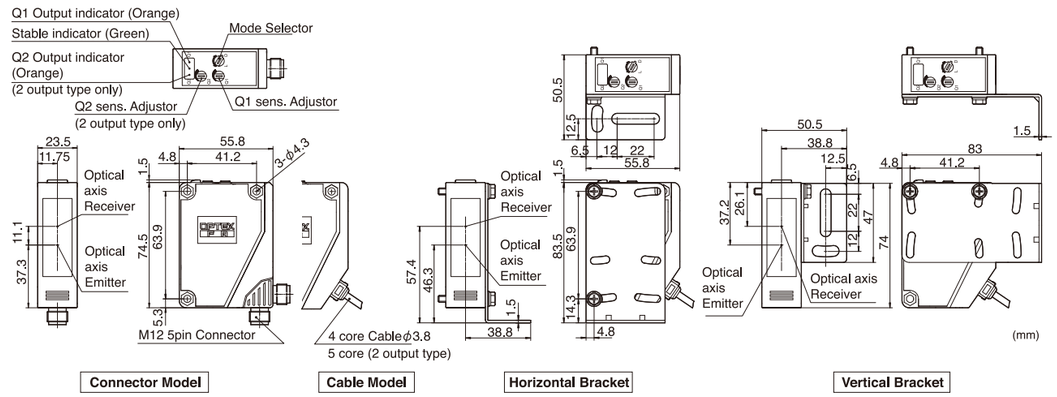
DOL-1205-G02M-R (2M type)
DOL-1205-G05M-R (5M type)



DOL-1205-G02M-R : 2000±50
DOL-1205-G05M-R : 5000±50

(mm)

Dimensions



Specifications

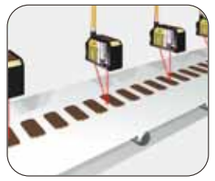
Model			Diffuse Reflective	Retro Reflective
Cable type	NPN	Output 1CH	**TOF-3V300N1**	**TOF-3V2000N**
		Output 2CH	**TOF-3V300N**	**-**
	PNP	Output 1CH	**TOF-3V300P1**	**TOF-3V2000P**
		Output 2CH	**TOF-3V300P**	**-**
Connector type	NPN	Output 1CH	**TOF-3V300CN1**	**TOF-3V2000CN**
		Output 2CH	**TOF-3V300CN**	**-**
	PNP	Output 1CH	**TOF-3V300CP1**	**TOF-3V2000CP**
		Output 2CH	**TOF-3V300CP**	**-**
Objects			Opaque 6%... 90%	Reflector：V-61
Sensing distance			3000mm (90% white)	20m with Reflector V-61
Light source			Red laser diode (wavelength 650nm)	
Spot size			φ12mm@3m	φ50mm@20m
Optical angle deviation			0.5°(9mrad) or less	
Hysteresis			15% Max：300… 1500mm / 6% Max：1500… 3000mm	10% Max：1… 4m / 3% Max：4… 20m
Resolution			2mm	10mm
Response time			0.5ms	2ms
Operating mode			Light ON/ Dark ON selectable	
Environmental illuminance			Sunlight : 4,000lx, Incandescent lamp : 3,000lx @1m	
Indicator			Output indicator: Orange x 2 (2 output type), Stable indicator : Green	
Sensitivity adjustment			4-turn Potentiometer	12-turn Potentiometer.
External input			Laser OFF	
Crosstalk prevention			2pcs Max.	
Supply voltage			DC10 - 30V ±10%, 70mA max.	
Circuit protection			Reverse Polarity, Over current	
Control output			2x NPN/PNP, Open collector, 30V/100mA, (Residual voltage 1.8V max.)	
Connection (cable)			φ3.8 2m cable 5 cores (2 output type) , 4cores (1 output type)	
Connection (M12 connector)			M12, 5pin (DOL-1205-G02M-R / DOL-1205-G05M-R)	
EMC			EN60497-5-2	
Warm-up time			300ms	
Internal short circuit			according to VDE 160	
Plastic materials			ABS/PMMA	
Protection category			IP67	
Vibration resistance			10...55Hz	
Shock resistance			500m/s2(50G)	
UL			CUL	
CE			EMC directive	
Operating temp. humidity			-10… +50°C, 35…85%	
Storage temp. humidity			-40… +70°C, 35…95%	
Temperature drift			±1% max.	
Laser class			FDA: Class Ⅰ JIS/IEC: Class1	

Laser Sensor

D series

- CMOS Image Sensor + Digital Display for easy setting.
- DR-Q series, transparent detection with AGC (Automatic Gain Control) function.
- BGS-DL series, the leading edge of BGS type sensors, the ultimate in Diffuse Reflective sensing.
- DT series, long distance Thru-beam sensor (max. 100 meters).

Applications



For detecting thin objects on the conveyor. (BGS-DL10T)

Any transparent object, PET / Glass / Plastic. (DR-Q150)

Positioning for ink printer (DR-500)

Stable sensing of aluminum pouch (DR-500)

Product Types

Cable / QD	Output	BGS / Accurate type	
		Laser CMOS Teach-in	Potentiometer
Distance		40 - 100mm	
Cable	NPN	BGS-DL10TN	BGS-DL10N
	PNP	BGS-DL10TP	BGS-DL10P
M8-QD	NPN	BGS-DL10TCN	BGS-DL10CN
	PNP	BGS-DL10TCP	BGS-DL10CP

Cable / QD	Output	BGS / Longer distance		
		Laser CMOS Teach-in	Potentiometer	
Distance		100 - 250mm	100 - 300mm	100 - 700mm
Cable	NPN	BGS-DL25TN	BGS-DL30N	BGS-DL70N
	PNP	BGS-DL25TP	BGS-DL30P	BGS-DL70P
M8-QD	NPN	BGS-DL25TCN	BGS-DL30CN	BGS-DL70CN
	PNP	BGS-DL25TCP	BGS-DL30CP	BGS-DL70CP

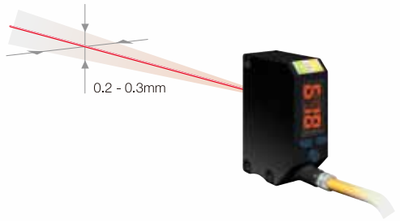
Cable / QD	Output	Transparent type (with teach-in)	
		Filled bottle	Empty bottle
Distance		1.5 meter	4.0 meter
Cable	NPN	DR-Q150TN	DR-Q400TN
	PNP	DR-Q150TP	DR-Q400TP
M8-QD	NPN	DR-Q150TCN	DR-Q400TCN
	PNP	DR-Q150TCP	DR-Q400TCP

Cable / QD	Output	Thri-Beam type (with potentiometer)
Distance		40 meter
Cable	NPN	DT-4000N
	PNP	DT-4000P
M8-QD	NPN	DT-4000CN
	PNP	DT-4000CP

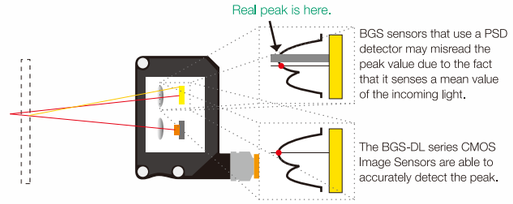
Cable / QD	Output	Retro-reflective type (with potentiometer)
Distance		5 meter
Cable	NPN	DR-500N
	PNP	DR-500P
M8-QD	NPN	DR-500CN
	PNP	DR-500CP

Repeat Accuracy

Very tight Repeat Accuracy, 0.2 - 0.3 mm for BGS type. Even Thru-beam and Retro types have 0.3mm Repeat Accuracy (*).
* = Tested at the middle point of sensing range.

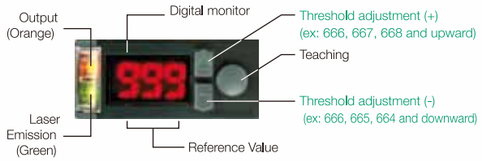


CMOS Image Sensor

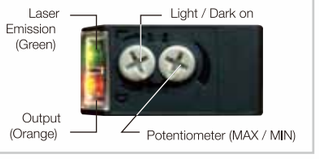


Pushbutton Teach with Fine Adjustment

In addition to a Teach button there are also two threshold adjustment buttons. Fine adjustments can be made to the threshold value after Teaching by using the adjustment buttons.

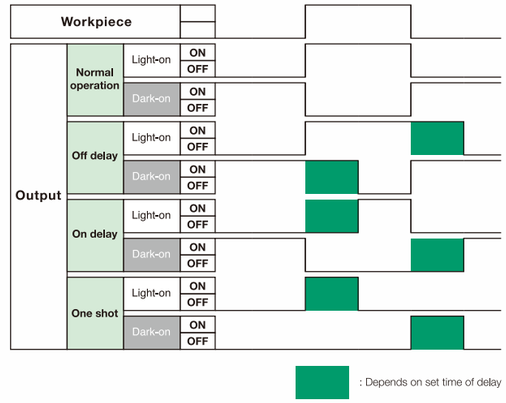


Low cost: Manual adjust type



Timer functions

The pushbutton teach models of the D series have built-in Timer functions for added flexibility.



Set time is referred as below ;

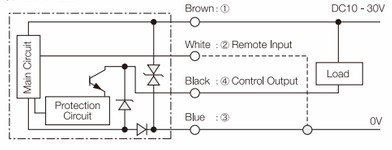
Time	ms						s			
	0	1	2	···	998	999	1	2	···	10
Display	000	001	002	···	998	999	01	02	···	10

* 1msec increment for 0-999 msec.
* Timer is not available for Manual adjust type sensors
* 1sec increment from 1sec to 10 sec.

Remote Input

The DR-Q and BGS-DL sensors have a Remote Teach input that can be used to remotely set the sensor sensitivity.

DR-Q / BGS-DL series



Class 2/Class II IEC, FDA Regulation

The D series conforms to Class 2 (IEC) and Class II (FDA) regulations.

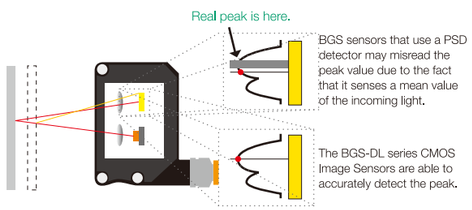
The world's first Laser / BGS with CMOS Image Sensor

BGS-DL series

BGS (Background Suppression) type sensors are the most accurate method of diffuse sensing, BGS sensors are able to detect objects without being influenced by either the background or the color of the workpiece. A conventional LED - BGS sensor is accurate, but a Laser CMOS - Laser BGS sensor is able to detect black and/or highly reflective surfaces reliably.

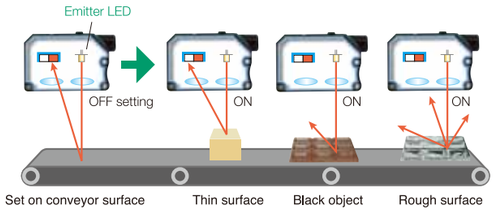
Great combination ; Laser and CMOS Image Sensor shuts out environmental influence.

CMOS Image Sensor system can detect light quantity at each CMOS pixel under well controlled shutter speed, therefore it sharply detects the peak value in the viewfield of sensor while PSD detects mean value of peaks as shown below. Actually it means CMOS Image Sensor System is the ideal way for such objects having reflecting and/or rough surface.



FGS Funciton is the best solution for detecting objects on the conveyor.

The BGS-DL sensors also have FGS function built-in. The FGS sensor detects any objects, thin, black, rough and reflective, on the surface of the conveyor.



Specifications

Model	Laser CMOS BGS (Teach-in type)		Manual adjust Potentiometer type		
Type	Accurate type	Long distance type	Accurate type	Long distance type	
Cable type	BGS-DL10TN (or DL10TP)	BGS-DL25TN (or DL25TP)	BGS-DL10N (or DL10P)	BGS-DL30N (or DL30P)	BGS-DL70N (or DL70P)
M8 connector type	BGS-DL10TCN (or DL10TCP)	BGS-DL25TCN (or DL25TCP)	BGS-DL10CN (or DL10CP)	BGS-DL30CN (or DL30CP)	BGS-DL70CN (or DL70CP)
Sensing distance	40-100mm	100-250mm	40-100mm	100-300mm	100-700mm
Spot size	ϕ1mm / 80mm	ϕ2mm / 200mm	ϕ3mm / 80mm	ϕ6mm / 200mm	
Sensitivity adjustment	Push button Teach with fine adjust buttons		4-turn potentiometer		
Hysteresis	3% / 80mm	10% / 200mm	5% / 80mm	5% / 200mm	5% / 300mm
Supply voltage	DC10-30V including 10% ripple (P-P)				
Power consumption	50mA max (12V), 35mA max (24V)		35mA		
Response time	1.5msec Max(fixed sensitivity)		0.7msec		
Timer	Off delay/On delay/One shot delay (1msec increment : 0-999msec, 1sec increment for 1-10 sec)		N/A		
External input	Remote Teach / Laser OFF selectable		N/A		
Light source	Red Laser Diode 650nm, Max 1mW 300s, Class 2		Red Laser Diode 650nm, Max 2mW 6s, Class 2 (Max 3mW for BGS-DL70)		
LED Indicator	Output indicator (orange), Laser emission (green)				
Digital indicator	7 segment, 3 digit Red LED		N/A		
Control output	NPN or PNP open collector DC30V 100mA max				
Operating mode	Light/Dark On selectable				
Operating temp / humidity	–10 to 50 °C / 35-85% RH				
Insulation resistance	20M Ohm or more (at 500V DC)				
Protection category	IP67				
Conformity	IEC, CE				
Shock resistance	50G (500m/S^2) , XYZ 3 directions				
Environmental illuminance	Sunlight : 10,000 lux, Incandescent lamp : 3,000 lux max				
Materials	ABS (housing), PMMA (lens)				

*1 Sensing distance with 100mm X 100mm gray 18% paper.
*2 Details of hysteresis by color/distance shall be referred in technical chart provided in this catalogue.

Transparent Detection with Laser Light Source is the best solution for Glass/PET

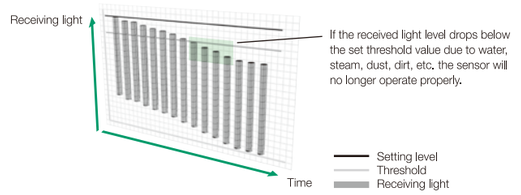
DR-Q series

The DR-Q Series offers superior performance in Transparent Object detection. With a 0.7 msec. response time it is ideal for use in high speed bottling applications.
Accurate detection is assured by the use of a Coaxial light source.
The AGC (Automatic Gain Control) circuit will automatically compensate for changes in the incoming light level (due to dust/dirt etc.) by adjusting the threshold setting.

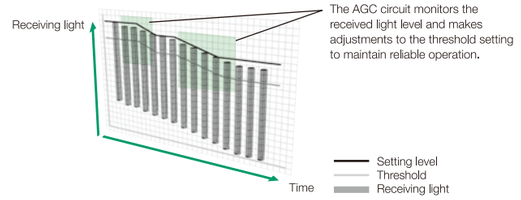

Coaxial Laser

AGC (Automatic Gain Control) circuit monitors the incoming light level to maintain reliable operation even in dusty / dirty conditions.

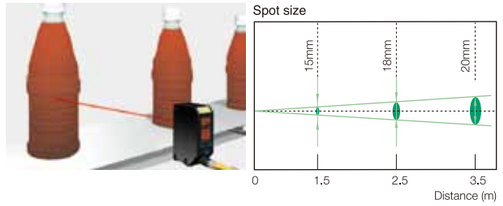
Conventional Retro Reflection sensor



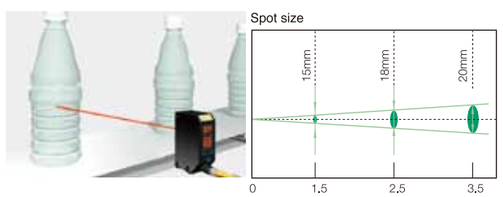
DR-Q series



DR-Q150T



DR-Q400T



Specifications

Model	Transparent type	
Type	Accurate type : For filled bottle	Long distance type
Cable type	DR-Q150TN (or Q150TP)	DR-Q400TN (or Q400TP)
M8 connector type	DR-Q150TCN (or Q150TCP)	DR-Q400TCN (or Q400TCP)
Sensing distance	1.5 meter	4 meter *2
Spot size	15mm / 1.5 meter	20mm / 3.5 meter
Sensitivity adjustment	Pushbutton teach with fine adjustment button	
Supply voltage	DC10-30V including 10% ripple (P-P)	
Power consumption	35mA	
Response time	0.7 msec	
Timer	Off delay/On delay/One shot delay (1msec increment : 0-999msec, 1sec increment for 1-10 sec)	
Light source	Red Laser Diode 650nm, Max 2mW 4μs, Class 2	
LED Indicator	Output indicator (orange), Laser emission (green)	
Digital indicator	7 segment, 3 digit Red LED	
Control output	NPN or PNP open collector DC30V 100mA max	
Operating mode	Light/Dark On selectable	
Operating temp / humidity	–10 to 50 °C / 35-95% RH	
Insulation resistance	20M Ohm or more (at 500V DC)	
Protection category	IP67	
Conformity	IEC, CE	
Shock resistance	50G (500m/S^2) , XYZ 3 directions	
Environmental illuminance	Sunlight : 10,000 lux, Incandescent lamp : 3,000 lux max	
Materials	ABS (housing), PMMA (lens)	

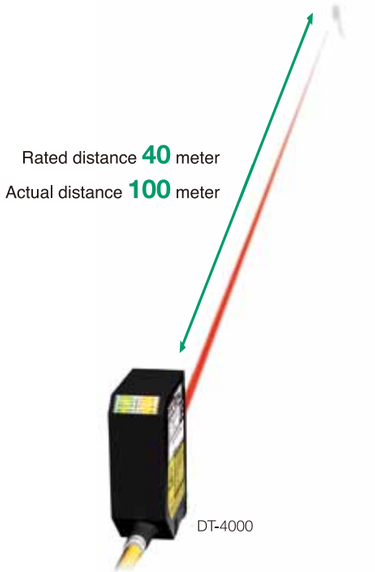
*1 Sensing distance taken with P250F reflector
*2 The distance between sensor head and the reflector should be more than 1000mm.

The most powerful Thru-beam and Retro-reflective type sensors available with a Laser Light Source.

DT series (Laser thru-beam) / DR series (Laser retro-reflective)

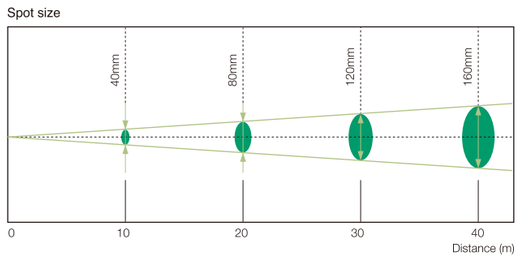
The D Series Laser Sensors offer a long sensing distance in conventional Thru-beam and Retro-reflective sensors.
The Co-axial Laser light source gives extremely tight alignment to the target.
Alignment of the sensor is easy thanks to the bright projected laser spot.
The DT Series Thru-beam detects at 100 meters distance while the actual Margin Spec is set at 40 meters.

Coaxial Laser



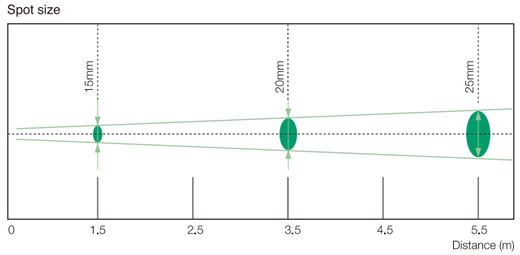
DT-4000

Spot size



DR-500

Spot size



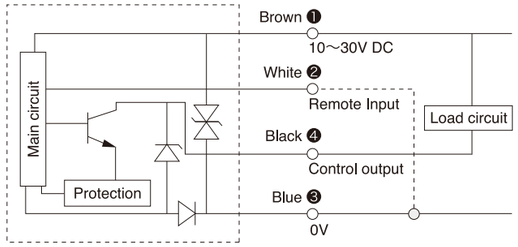
Specifications

Model	Potentiometer adjustment type	
Type	Thru-Beam	Retro reflective
Cable type	DT-4000N (or 4000P)	DR-500N (or 500P)
M8 connector type	DT-4000CN (or 4000CP)	DR-500CN (or 500CP)
Sensing distance	40 meter	5 meter
Spot size	15mm/5 meter	20mm/3.5 meter
Sensitivity adjustment	1-turn potentiometer	
Supply voltage	DC10-30V including 10% ripple (P-P)	
Power consumption	40mA	30 mA
Response time	0.5msec	
Light source	Red Laser Diode 650nm, Max 2mW 4s, Class 2	
LED Indicator	Output indicator (orange), Laser emission (green)	
Digital indicator	N/A	
Control output	NPN or PNP open collector DC30V 100mA max	
Operating mode	Light/Dark On switchable	
Operating temp / humidity	-10 to 50 °C / 35-95% RH	
Insulation resistance	20M Ohm or more (at 500V DC)	
Protection category	IP67	
Conformity	IEC, CE	
Shock resistance	50G (500m/S²) , XYZ 3 directions	
Environmental illuminance	Sunlight : 10,000 lux, Incandescent lamp : 3,000 lux max	
Materials	ABS (housing), PMMA (lens)	

*1 Sensing distance taken with P250F reflector

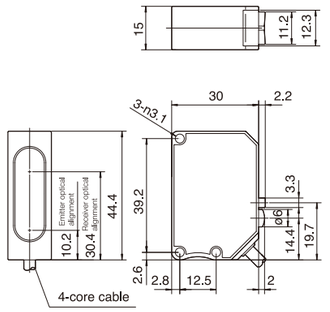
Circuit diagram

DR-Q / BGS-DL series

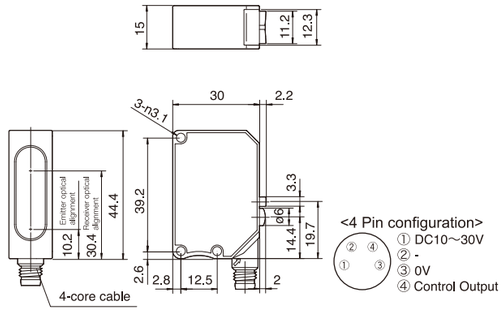


Dimensions

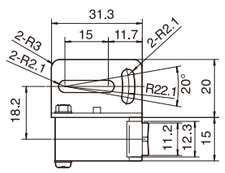
Cable type sensor



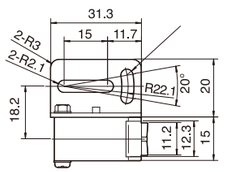
Connector type sensor

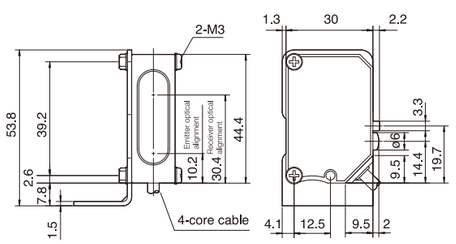


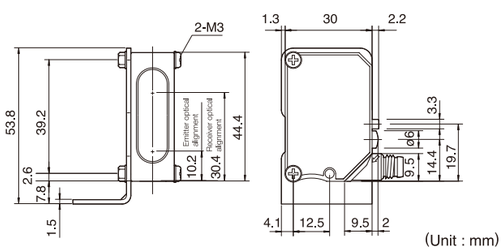
Cable type sensor with bracket



Connector type sensor with bracket

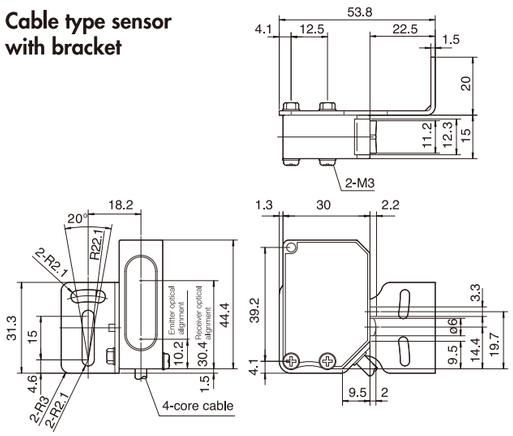




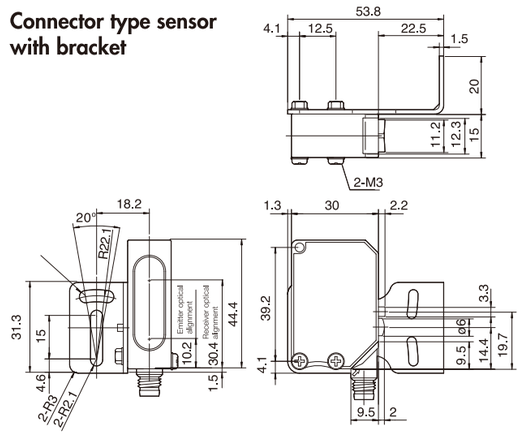


(Unit : mm)

Cable type sensor with bracket

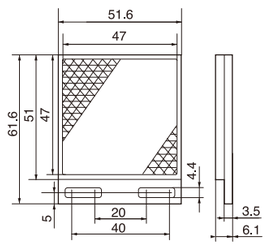


Connector type sensor with bracket

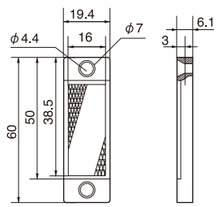


Reflectors

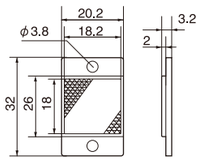
P250F



PL20F



PL10F

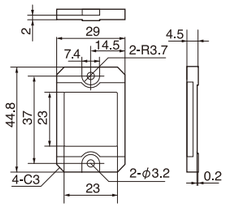


Sensing distance by reflectors

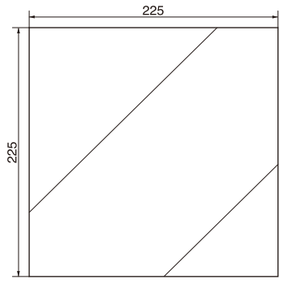
	P250F	PL20F	PL10F
DR-Q400T	4.0	2.8	1.0
DR-Q150T	1.5	1.0	0.5
DR-500	5.0	3.5	1.2

(Unit : meter)

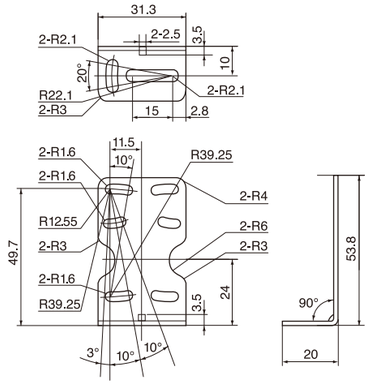
MP45



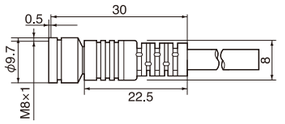
MP225



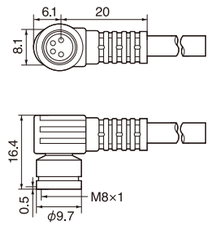
Mounting Bracket



JCN-S : M8 Straight type



JCN-L : M8 L-shape type



Options

P250F : Standard reflector

61.6 × 51.6 mm
Standard accessory for any D series Retro type

PL20F : Small reflector

60 × 19.4 mm
For space saving

PL10F : Miniature reflector

32 × 20.2 mm
For limited space

MP45 : Fine Positioning reflector

44.8 × 29mm
Fine pixels of surface.
Ideal for use of fine positioning.

MP225 : Large reflector

225 × 225mm
Free-cut reflector sheet of MP45 material.

JCN-S : M8 Straight type

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

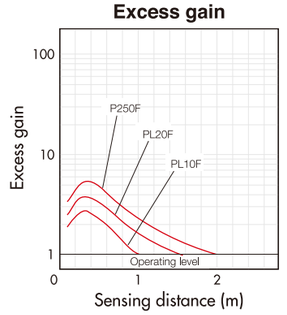
JCN-L : M8 L-shape type

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

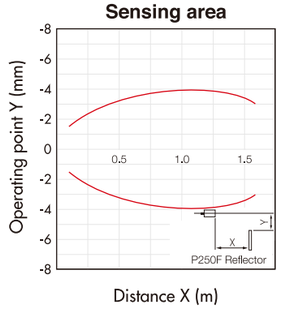
Reference (typical)

DR-Q150TN DR-Q150TCN

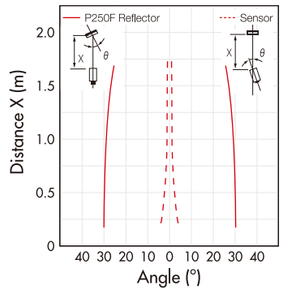
Excess gain



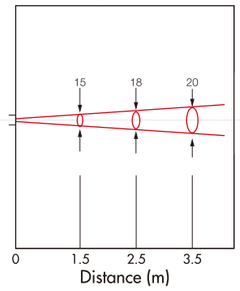
Sensing area



Angular deviation

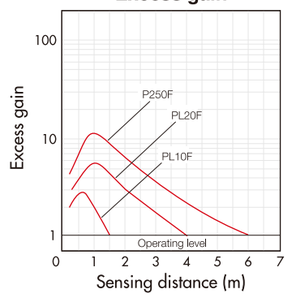


Spot size (mm)

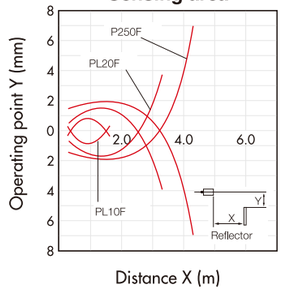


DR-Q400TN DR-Q400TCN

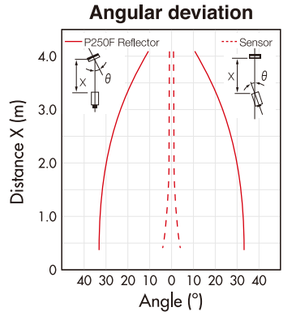
Excess gain



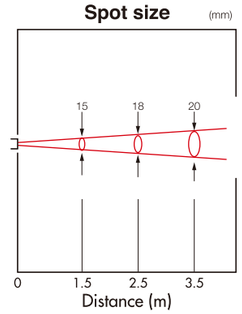
Sensing area



Angular deviation



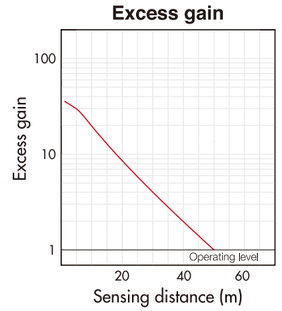
Spot size (mm)



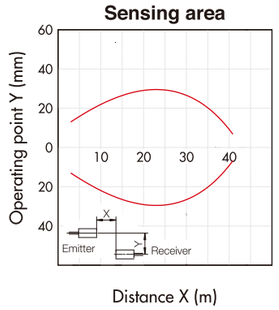
Reference (typical)

DT-4000N DT-4000CN

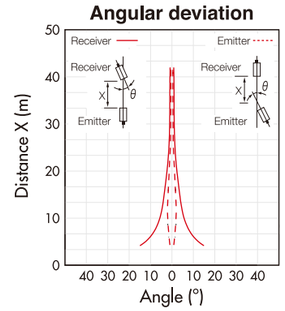
Excess gain



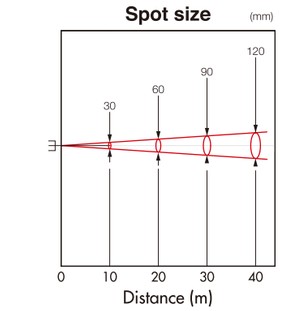
Sensing area



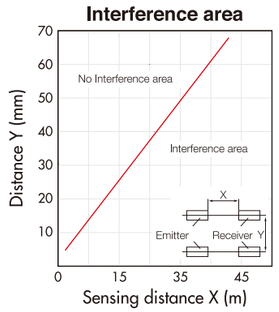
Angular deviation



Spot size (mm)

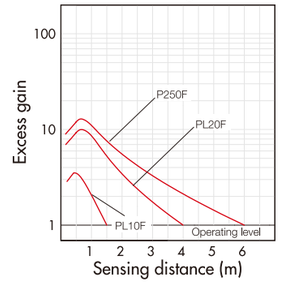


Interference area

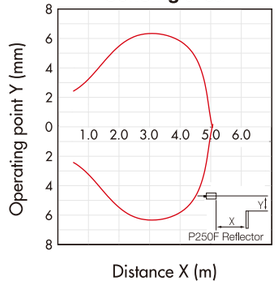


DR-500N DR-500CN

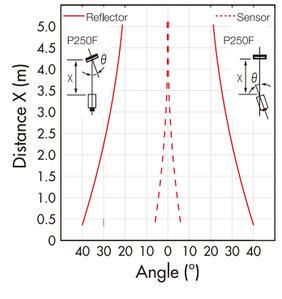
Excess gain



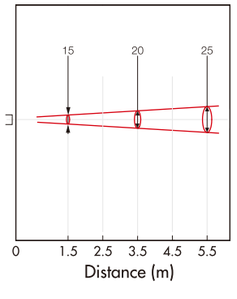
Sensing area



Angular deviation

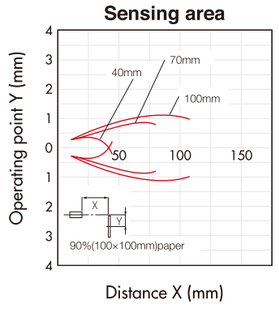


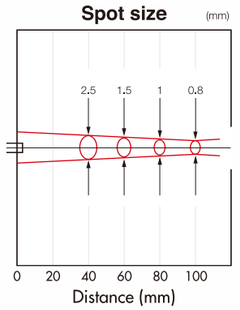
Spot size (mm)

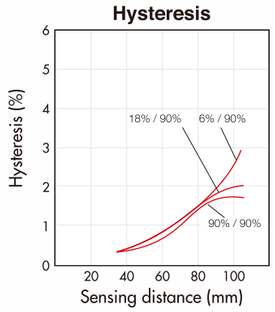


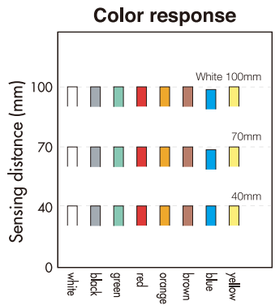
Reference (typical)

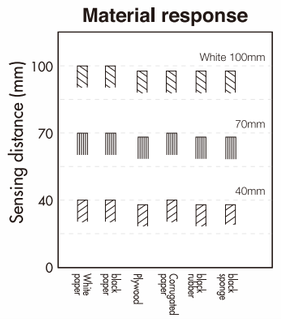
BGS-DL10TN
BGS-DL10TCN



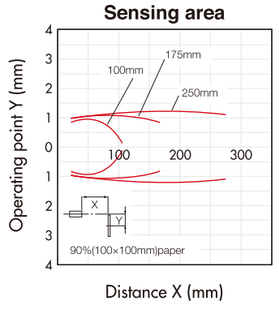


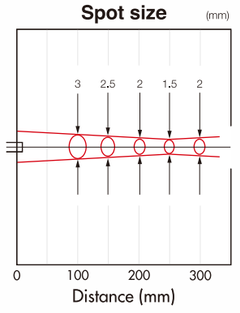


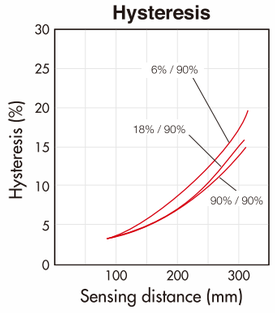


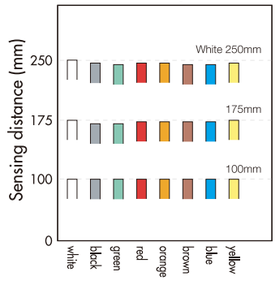


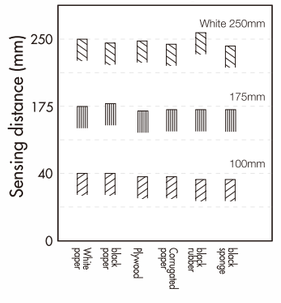
BGS-DL25TN
BGS-DL25TCN

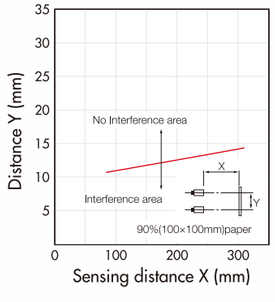












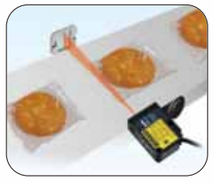
Laser Sensor

D2SA series

- Digital Amplifier with Modular Laser Optics.
  Two independent outputs, high speed response up to 60µsec.
- Max. 70 meter sensing distance with coaxial beam light source.
  (Retro-reflective Type)

Applications

Edge guiding of Transparent film



Sensing transparent bags

Checking for the presence of threads

Locating a small IC chip held by a vacuum pickup

Sensor head

Type	Model	Mode	Sensing Distance
Retro Reflective	DSR-800 (Reflector MP45)	Long	8 meter (*1)
		Standard	5 meter
		Fast	2 meter
	DSR-5000 (Reflector P250F) (*2)	Long	0.5 - 50 meter
		Standard	0.3 - 35 meter
		Fast	0.1 - 20 meter
Diffuse Reflective	DSD-100	Long	1.0 meter
		Standard	0.7 meter
		Fast	0.25 meter
Thru-beam Cable type	DSTC-200	Standard	2 meter
	DSTA-200	Standard	2 meter
		Measurement	0.5 meter
Thru-beam M8 QD type	DSTC-200-M8	Standard	2 meter
	DSTA-200-M8	Standard	2 meter
		Measurement	0.5 meter

Amplifier

Type	Mode	Specifications
Stand Alone Type	D2SA-MNS	2CH with Analogue, NPN
	D2SA-MPS	2CH with Analogue, PNP
	D2SA-MN3S	1CH, NPN
	D2SA-MP3S	1CH, PNP
	D2SA-MNS-M8	1CH, NPN, M8-QD
	D2SA-MPS-M8	1CH, PNP, M8-QD
Interconnect Type Master Units	D2SA-MN	2CH with Analogue, NPN
	D2SA-MP	2CH with Analogue, PNP
	D2SA-MN3	1CH, NPN
	D2SA-MP3	1CH, PNP
	D2SA-MN-M8	1CH, NPN, M8-QD
	D2SA-MP-M8	1CH, PNP, M8-QD
Interconnect Type Slave Units	D2SA-SN	2CH with Analogue, NPN
	D2SA-SP	2CH with Analogue, PNP
	D2SA-SN1	1CH, NPN
	D2SA-SP1	1CH, PNP
	D2SA-SN-M8	1CH, NPN, M8-QD
	D2SA-SP-M8	1CH, PNP, M8-QD

*1 Lens attachment BL-W130L-1 will change the sensing distance of DSR-800 head as follows ;
Line Beam : Long mode / 2m, Standard/1.5m, Fast / 1m
Area Beam : Long mode / 1.5m, Standard / 1m, Fast / 0.6m

*2 The MP-45 reflector is used when the sensing distance will be less than 10 meters.
MP45 : Long mode / 0.5 - 20m, Standard / 0.3 - 10m, Fast / 0.1 - 5m

*3 The sensing distance of the DSD-100 is defined with a 200 x 200 mm white paper target.

*4 Fast Mode is not available when using the "DSTA" sensing heads in Measurement Mode.
Measurement Mode is only possible when using the 2CH type amplifiers.

Amplifier

The Interconnect Type Amplifiers (Master: D2SA-M, Slave: D2SA-S) can be connected in parallel to provide Cross-talk prevention as well as to transfer settings.
It is possible to connect a maximum of 30 amplifiers together. (12VDC @ 40℃ ambient or less)

2 Amplifier Types (Standalone & Interconnect)

The Interconnect Type amplifiers are convenient when using multiple D2SA amplifiers in parallel.
8 amplifiers can be connected together if the ambient temperature does not exceed 50℃.
A maximum of 30 amplifiers can be connected together, the surrounding temperature must be 40℃ or less.

The Interconnect Type amplifiers automatically provide Cross-talk prevention for up to 4 amplifiers.
The D2SA series amplifiers can be connected to Optex-FA's D2RF series fiber optic amplifiers.

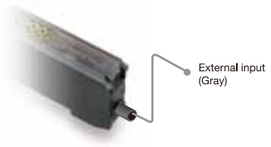
Stand Alone type

Interconnect type
Cross-talk prevention for up to 4 amplifiers.

Programmable external input

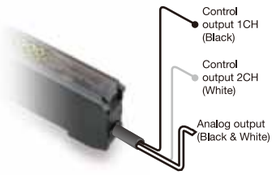
The External input can be programmed to operate in one of the following modes.

- Remote teach
- Synchronizing signal input
- Laser OFF
- Counter reset



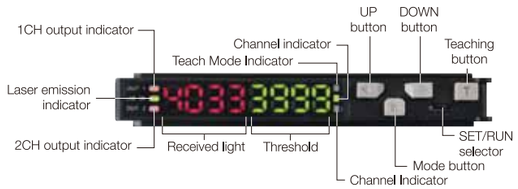
2 Independent outputs & Analog

2CH models have two digital outputs for control and/or alarm, there is also a 4~20 mA analog output. The external input can be configured to operate as needed.



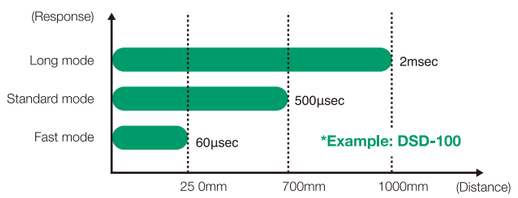
Dual Digital Display

The Threshold value and the Reflected Light level are both indicated at the same time, setting the sensitivity is easy.



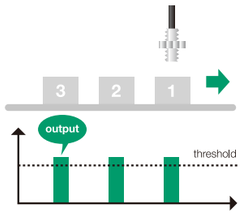
Response Time

Select the sensing distance and response time based upon your application.



Counter Mode

The output turns ON when the count value reaches the preset number.
The preset number can be reset by remote teach.



e-con, the easy connection

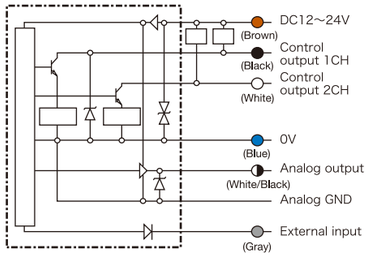
Just snap-in the e-con to connect to amplifiers. All the sensor heads are connectable to any amplifier with the preset e-con mechanics.

IP67 water tightness

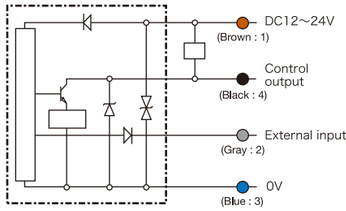
All the DS Series sensor heads secures IP67 Water tightness with its rugged housing.

Wiring Diagram : (N = NPN, P=PNP)

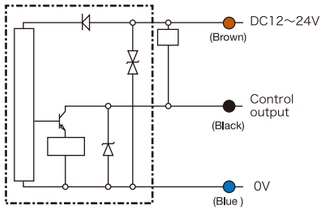
2CH output types
D2SA-MN(P)S / D2SA-MN(P) / D2SA-SN(P)



1CH, M8-QD types
D2SA-MN(P)S-M8, D2SA-MN(P)-M8



1CH types
D2SA-MN(P)3S / D2SA-MN(P)3 / D2SA-SN(P)1



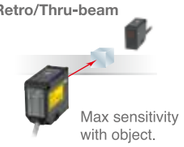
*1 Slave Unit "D2SA-S□□" is powered by Master unit, so power lines are not available.

A choice of 6 convenient Teach functions to solve any application.

Single Point Teach

Diffuse Reflective

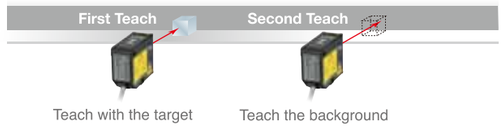
Retro/Thru-beam



Use this teaching mode when no target is present.
Set the threshold so the sensor does not detect the background.

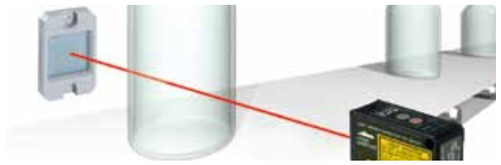
Two Point Teach

Diffuse Reflective



This is the basic setting method for the DSD-100 Diffuse Reflective type sensor. First teach with the target present and then teach the background. The threshold is then set between the target value and the background.

Transparent Object Teach

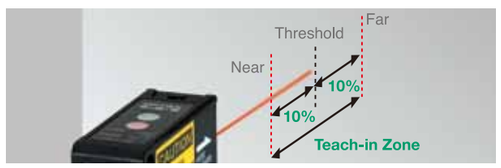


This mode is only for the DSR-800 Retro-Reflective sensor.
Teach without the target present so that the sensor is set to the maximum sensitivity, the DSR-800 is able to easily detect transparent film, bottles, glass, etc.

Automatic Teach

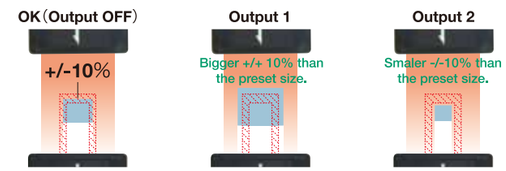
In this mode there is no reason to stop the conveyor. It is possible to teach the sensor while the product is running.

Zone Teach



Select the detection area. Use the Up / Down buttons to set the area within +/- 10%. After teaching this area can be increased or decreased by adjusting the settings.

Judgement Teach

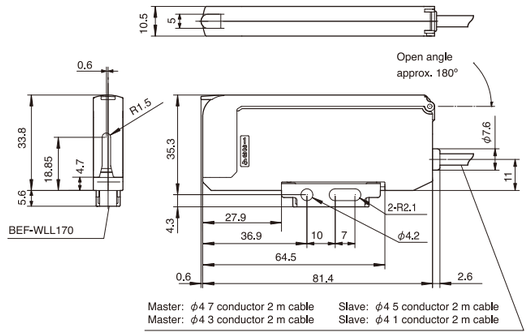


This function is exclusive to the DSTA-200 wide beam measurement sensing heads. Used to judge the size and width of a target within +/- 10% of the specified size. Even if the object position changes the sensor will detect it, so this is actually Area Teach.

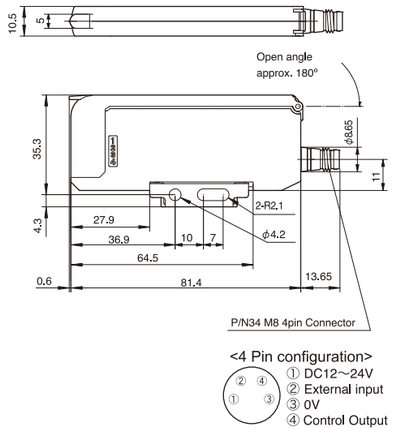
Amplifier Dimensions

Stand-alone type

Cable type

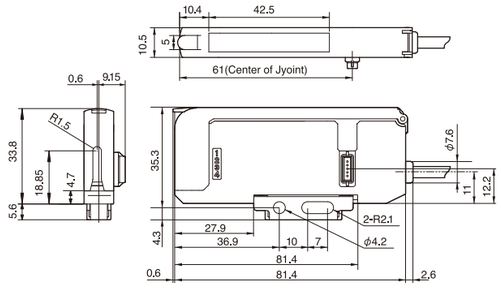


M8-QD type



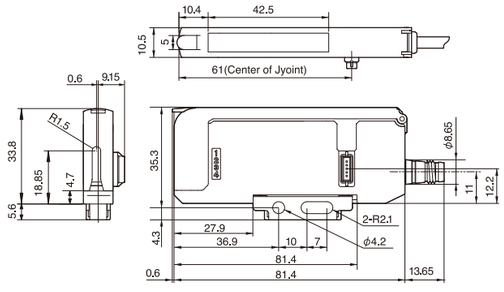
Interconnection type

Cable type



Slave unit

M8-QD type



(Unit : mm)

Specifications

1CH Output Type Specifications

Model		Stand-alone type	Interconnect type	
			Master Unit	Slave Unit
Cable type	NPN	D2SA-MN3S	D2SA-MN3	D2SA-SN1
	PNP	D2SA-MP3S	D2SA-MP3	D2SA-SP1
M8 Connector type	NPN	D2SA-MNS-M8	D2SA-MN-M8	D2SA-SN-M8
	PNP	D2SA-MPS-M8	D2SA-MP-M8	D2SA-SP-M8
Response time		60μ /500μ /2msec (Fast/Standard/Long) selectable		
External input		External Input (*1) : Select one among (1) teach (2) Synchronizing (3) Laser OFF, or (4) Reset Counter (This functrion is available only with M8-QD type except Slave unit of M8-DQ Type)		
Control output		NPN or PNP Open collector, 100mA Max, residual voltage 1.8V Max		
Analogue output		N/A		
Timer		On delay / Off delay / One Shot / No delay, 1msec to 9s (1ms increment)		
Operating mode		Light ON / Dark ON selectable		
Crosstalk prevention		4pcs Max.		
Sensivity adjustment		Teach-in (manual adjustment is possible)		
LED Indicator		Green (laser power), Orange (output), Red (teaching), Green (active CH)		
Digital display		8 digits (7 segments)		
Power consumption		45mA Max, 24V DC		
Supply voltage		12 - 24V DC +/- 10%, ripple 10%		
Operating temp / humidity (*3)		–25 to 55 °C (–13 to 131 °F) / 35 to 85% RH (no freezing)		
Storage temp / humidity		–40 to 70 °C (–40 to 158 °F) / 35 to 85% RH (no condensation)		
Shock resistance		50G (500m/s²) , XYZ 3-ways		
Protection category		IEC IP50		
Materials		PC		

2CH Output Type Specifications

Model		Stand-alone type	Interconnect type	
			Master Unit	Slave Unit
Cable type	NPN	D2SA-MNS	D2SA-MN	D2SA-SN
	PNP	D2SA-MPS	D2SA-MP	D2SA-SP
M8 Connector type	NPN	-	-	-
	PNP	-	-	-
Response time		60μ /500μ /2msec (Fast/Standard/Long) selectable		
External input		External Input (*1) : Select one among (1) teach (2) Synchronizing (3) Laser OFF, or (4) Reset Counter Control Output : 2CH, used as Control Output or Alarm output		
Control output		NPN or PNP Open collector, 100mA Max, residual voltage 1.8V Max		
Analogue output		4-20mA (*2)		
Timer		On delay / Off delay / One Shot / No delay, 1msec to 9s (1ms increment)		
Operating mode		Light ON / Dark ON selectable		
Crosstalk prevention		4pcs Max.		
Sensivity adjustment		Teach-in (manual adjustment is possible)		
LED Indicator		Green (laser power), Orange (output), Red (teaching), Green (active CH)		
Digital display		8 digits (7 segments)		
Power consumption		45mA Max, 24V DC		
Supply voltage		12 - 24V DC +/- 10%, ripple 10%		
Operating temp / humidity (*3)		–25 to 55 °C (–13 to 131 °F) / 35 to 85% RH (no freezing)		
Storage temp / humidity		–40 to 70 °C (–40 to 158 °F) / 35 to 85% RH (no condensation)		
Shock resistance		50G (500m/s²) , XYZ 3-ways		
Protection category		IEC IP50		
Materials		PC		

*1 The teach mode preset at ampliifer will be done with External Teach
*2 Load impedence 300Ω Max
*3 Up to 3pcs of interconnection. Up to 30 pcs with 40 °C (104 °F) surroundings operated in 12V DC.

Options

JCN-S : M8 Straight type

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

JCN-L : M8 L-shape type

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

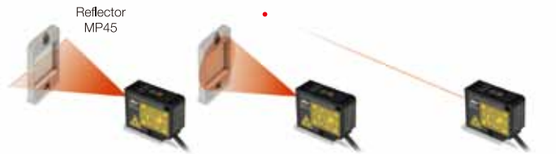
BEF-EB01-W190 : Fixture terminal

Laser Head Lineup (IP67 protection. Visible red laser for easy alignment)

Retro Reflective Type

The DSR-800 projects a very small Spot beam that is only 2 mm in diameter. There is an optional lens attachment (BL-W130L-1) that can be used to change the projected beam into a 40 mm wide line or a large circular beam.

The DSR-5000 has a maximum sensing distance of 70 meters in the Long Distance mode. The sensing distance is determined by the Response time that has been selected. The DSR-800 is able to detect Glass and/or PET bottles up to a maximum distance of 8 meters. Both types will project a 2 mm diameter Spot beam at 2 meters.



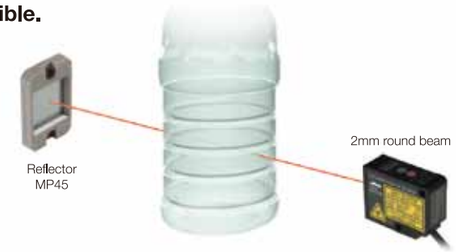
DSR-800 with Line Beam of 40 X 1mm (at 300mm distance) When using the BL-W130L-1 lens attachment

DSR-800 with Area Beam of 35 X 35mm (at 300mm distance) When using the BL-W130L-1 lens attachment

DSR-800 (8 meter) and DSR-5000 (70 meter) with 2mm round spot (at 2 meter distance).

DSR-800 : Three types of projected beams are possible.

The DSR-800 will reliably detect clear glass and/or PET bottles. The 2 mm diameter projected beam combined with the "Glass Teach" function insure that the detection of clear materials is easy to setup.



The projected beam of the DSR-800 can be changed to a Wide Line beam (40 x 1 mm), or Circular Area beam (35 x 35 mm) by using the optional lens attachment BL-W130L-1.

BL-W130L-1 lens attachment

DSR-5000 : Max 70 meter of sensing distance
(Long Mode with Sensitivity Compensation ON)

When used with the P250F reflector a 70 meter distance is possible.

Diffuse Reflective Type

The DSD-100 has a maximum sensing distance of 1.5 meters in the Long mode. The co-axial beam provides accurate sensing regardless of the orientation of the workpiece.

With a 1 mm projected beam at 1 meter distance, it is possible to detect the target through a small opening.

DSD-100, 1 mm coaxial spot beam.

DSD-100 : Diffuse Reflective sensor with1.5 meter sensing distance.

In the Long mode with Sensitivity Compensation ON, a 1.5 meter sensing distance is possible. Ideal for positioning applications due to the coaxial optics and 1 mm projected beam.

Coaxial beam

Thru-beam type

There are two models, the DSTC-200 (2 mm spot) or the DSTA-200 (30 x 2.5 mm line array). The DSTA-200 is a Measurement type sensor with a 30 mm wide beam. The 4 to 20 mA analog output can be used for measuring the size of objects. M8 QD connector models are available for easy maintenance.

The DSL-8L04-2-130 connecting cable is required for use with the M8 types.

DSL-8L04-2-130, M8 QD cable for sensor head DSTA(C)-200-M8

DSTA-200, Line beam, 30 x 2.5 mm width at 50 cm distance.

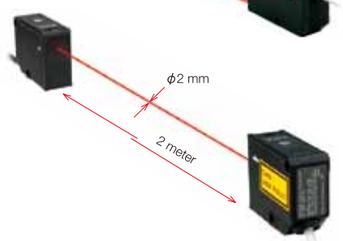
DSTC-200, Standard Thru-beam, 2 mm spot size at 2 meter distance.

DSTA-200 : 30mm width Line Beam for sorting application with 4-20mA output.

Ideal for sorting by width and size of objects. Measurement Mode will give analogue signal for use in the range of 0.5 meter.

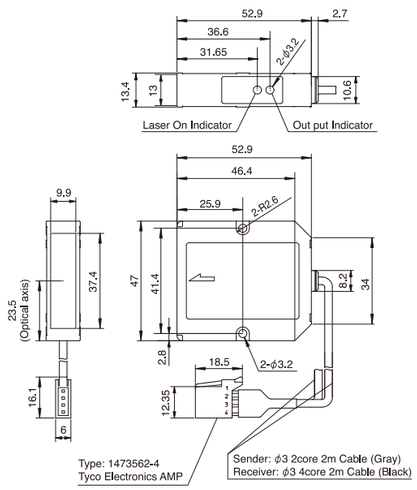
DSTC-200 : 2mm sharp and small spot

At the rated distance of 2 meters the projected beam is only 2 mm in diameter.

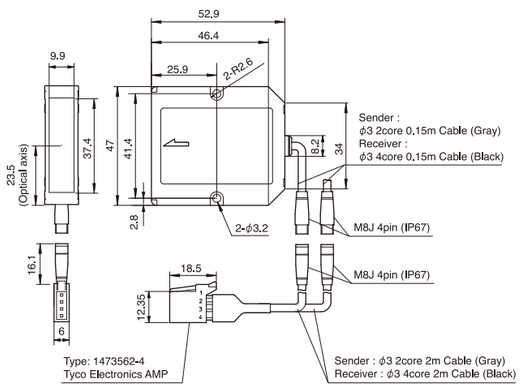


Laser Head Dimensions

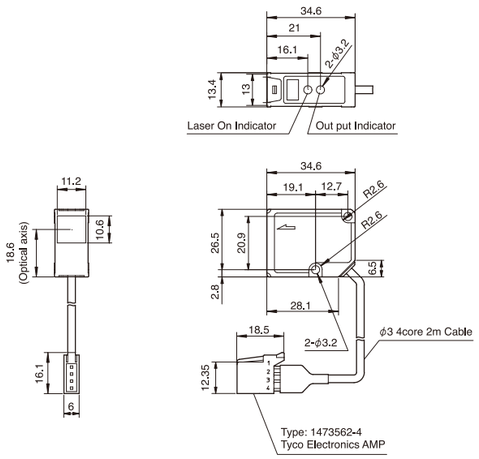
DSTA-200



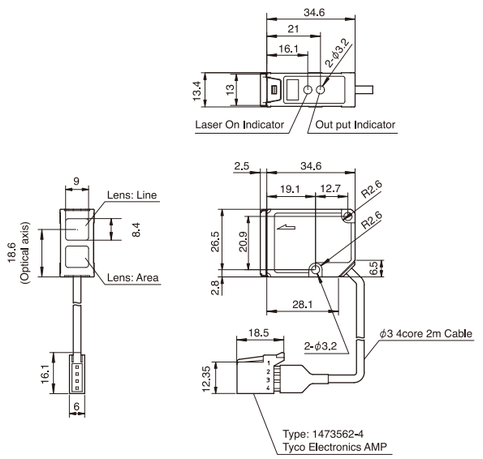
DSTA-200-M8



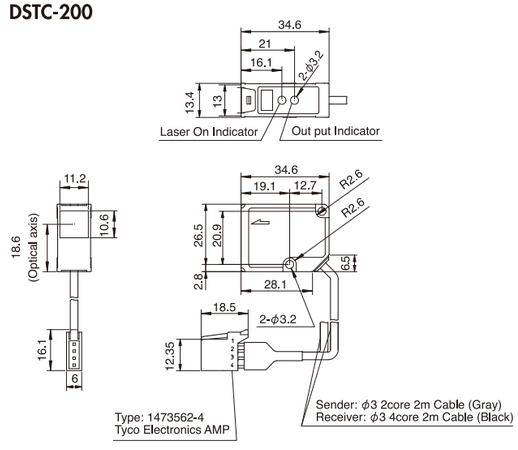
DSR-800 / DSR-5000 / DSD-100



DSR-800 + Lens Attachment

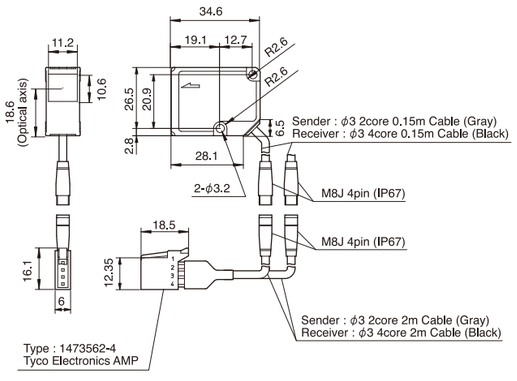


DSTC-200

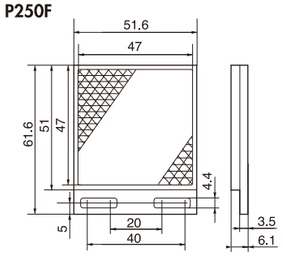


The sensing head dimensions for the DSR-5000,DSR-800 and DSD-100 are the same as the DSTC-200 with the exception of the cable.

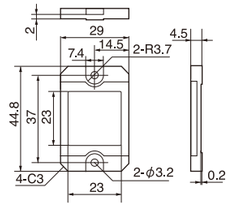
DSTC-200-M8



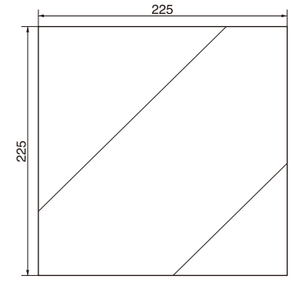
P250F



MP45



MP225



(Unit : mm)

Specifications

Model		Retro-reflective type		Diffuse reflective type	Thru-beam type	Thru-beam / Measurement type
	Cable	DSR-5000	DSR-800	DSD-100	DSTC-200 Emitter: DSTC-D Receiver: DSTC-200	DSTA-200 Emitter: DSTA-D Receiver: DSTA-200
	M8 QD-type	-	-	-	DSTC-200-M8	DSTA-200-M8
	Emitter M8	-	-	-	DSTC-S	DSTA-S
	Detector M8	-	-	-	DSTC-R	DSTA-R
Amplifier unit		D2SA-M ☐☐ /D2SA-M ☐-M8 / D2SA-S ☐☐				
Light source		Visible light semiconductor laser 650mm				
Output		max. 3mW			max. 390W	
IEC / JIS CLASS		CLASS 2			CLASS 1	
FDA CLASS		Class Ⅱ				
Sensing distance (*1)	**Long**	0.5 - 50 m	8 m	1 m	2 m	2 m Length measurement mode: 0.5 m (Only Long and Standard)
	Standard	0.3 - 35 m	5 m	0.7 m		
	Fast	0.1 - 20 m	2 m	0.25 m		
Spot size (*2)		Approx. ϕ2 mm (Distance: 2 m)		Approx. ϕ1 mm (Distance: 1 m)	Approx. ϕ2 mm (Distance: 2 m)	Approx. 30 x 2.5 mm (Distance: 2 m)
Repeat accuracy (*3)		0.2 mm		0.2 mm	0.2 mm	0.3 mm
LED Indicator		Laser radiation indictor light: Green Output indicator light: Orange				
Operating temp / humidity		-10 to +55°C/35 to 85 %RH (No condensation or freezing)				
Storage temp / humidity		-25 to +70°C/35 to 85 %RH (No condensation or freezing)				
Environmental illuminance		3,000 lx (Incandescent light) 10,000 lx (Sunlight)				
Shock resistance		10 to 55 Hz Double-amplitude 1.5 mm 2 hours at each direction of X, Y and Z				
Protection category		IP67				
Material		PC (Case, Cover) PMMA / Glass (Front glass)				
Weight (including the codes) (*4)		45g			90g	115g

* 1 DSD-100 : With white paper (90 %) of 200 x 200 mm
DSR-800 : With the reflector MP45 (accessory)

* 2 Defined with center strength 1/e^2 (13.5%).
There may be leak light other than the specified spot size. The sensor may be influenced when there is a highly reflective object around the target.

* 3 Right angle to sensing axis.

* 4 The weights of DSTC-200 and DSTA-200 include the emitter and the reciever.

* For the model M8-QD type, replacement is available only for the for the emitter and the detector.

Class II , FDA Regulation

The D2SA series conforms to FDA Class Ⅱ .

Options

MP45 : Standard reflector for DSR-800

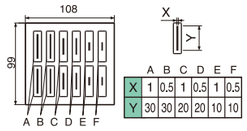
P250F : Long distance reflector for DSR-5000

MP225 : Large reflector

225 × 225mm
Free-cut reflector
sheet of MP45 material.

BL-W130L-1 : Beam Selector

BL-W130L-2 : Slit Mask for DSTA-200 sensor head

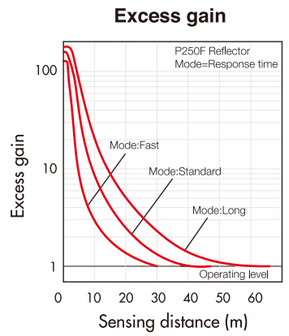


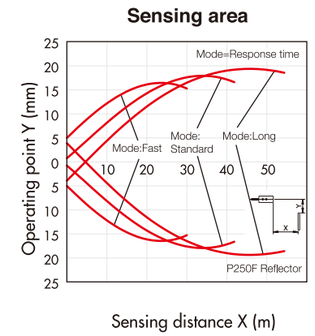
	A	B	C	D	E	F
X	1	0.5	1	0.5	1	0.5
Y	30	30	20	20	10	10

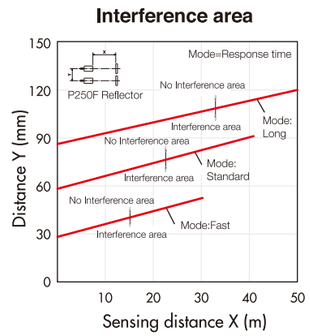
DSL-8L04-2-130 : M8-QD cable

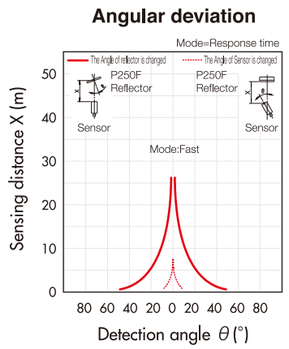
Reference (typical)

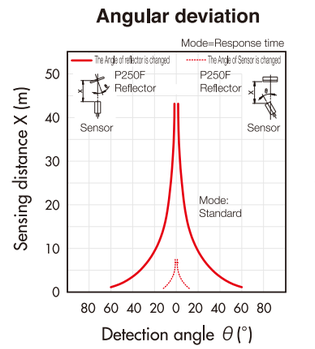
DSR-5000

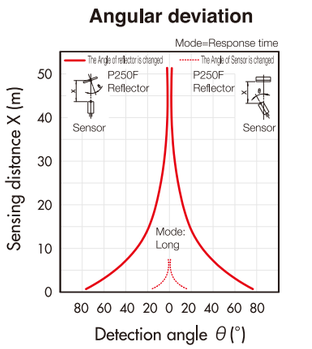




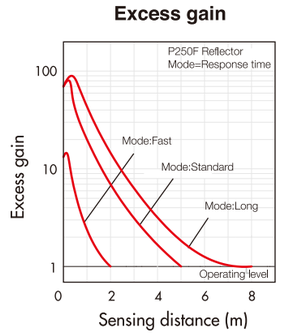


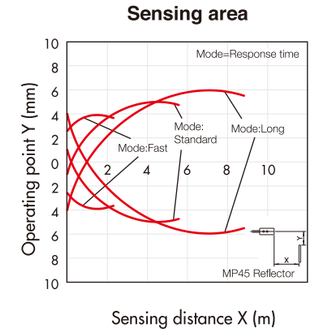


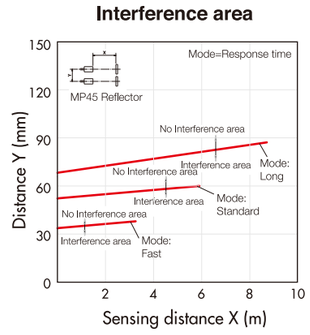


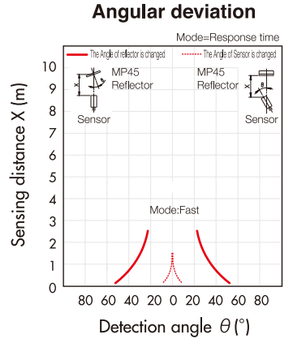


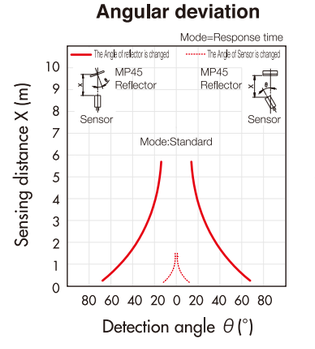
DSR-800

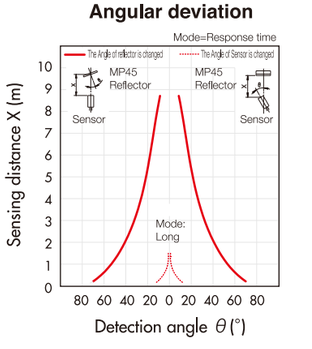








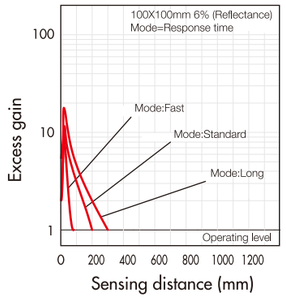




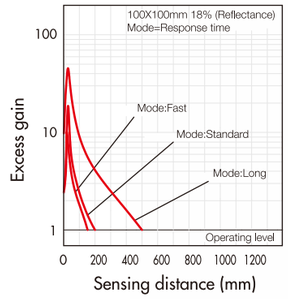
Reference (typical)

DSD-100

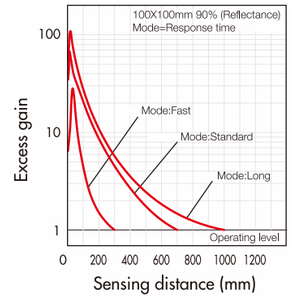
Excess gain 6%



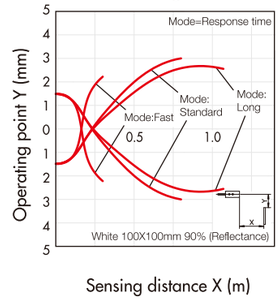
Excess gain 18%



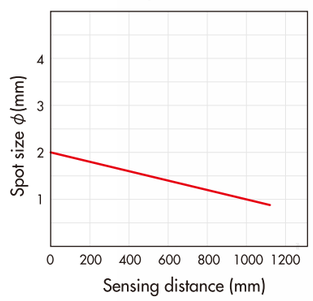
Excess gain 90%



Sensing area

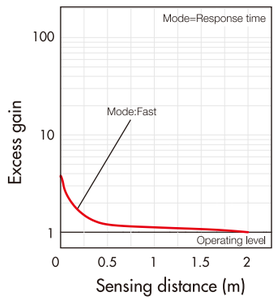


Spot size

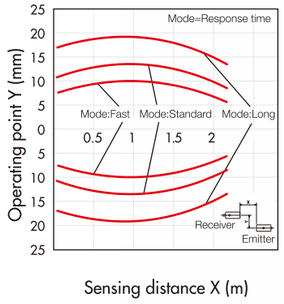


DSTC-200

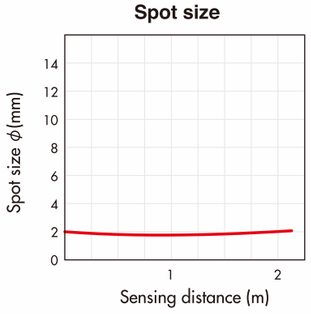
Excess gain



Sensing area

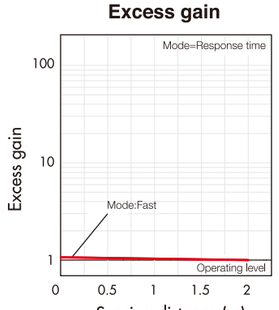


Spot size

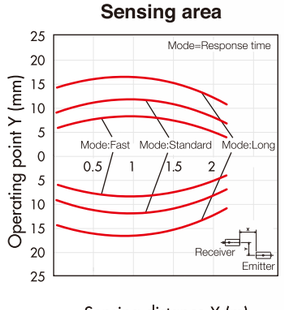


DSTA-200

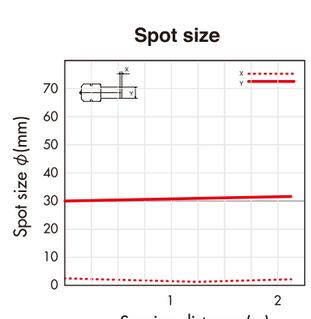
Excess gain



Sensing area



Spot size



Laser Sensor

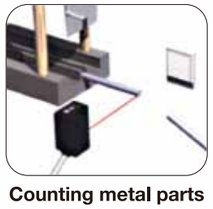
Z-L / BGS-ZL series

- The Laser light source projects a 2 mm spot at 400 mm distance (Diffuse mode).
- BGS (Background Suppression) sensing is also available in the BGS-ZL series.

Applications

Edge control (BGS-ZL30)

Height control of multi-colored object (BGS-ZL30)

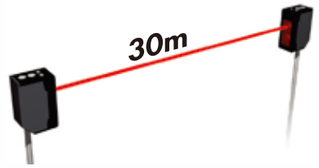


Counting metal parts (ZR-L1000)

Thin plates counting (ZT-L3000)

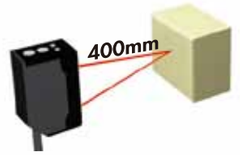
Features

Thru-Beam type



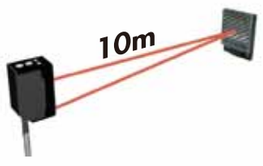
ZT-L3000

Diffuse type



ZD-L40

Retro Reflective type



ZR-L1000

BGS type

BGS-ZL30
BGS-ZL10

Class 2/Class II IEC, FDA Regulation

Conforms to Class 2 (IEC) and Class II (FDA) regulations.
(Class 1 for Thru-beam type)

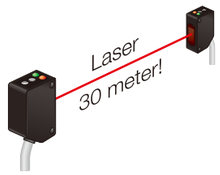
Laser Thru-beam / RetroType

- ***30 meter sensing distance (Thru-beam type), fast 250μsec. response time.***
- ***Compact size with Laser source, small 2 mm diameter projected beam.***
- ***IP67 rating***
- ***M8 QD types are available***

Features

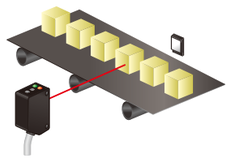
Thru-beam type, ZT-L series

30mm spot size at 30 meter sensing distance



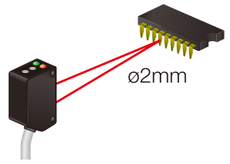
250μsec response

Good for fast moving objects.



Diffuse Reflective, ZD-L type

Fine 2mm spot at 400mm sensing distance

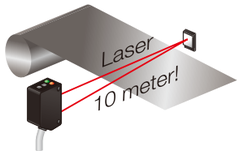


Cross-talk prevention

2 sensors can be mounted side-by-side.

Retro Reflective, ZR-L type

10mm spot size at 10 meter sensing distance



IP67 rating

Hose it down!
Water-tightness is tested to IP67.

Specifications

Model		Thru-beam	Polarized Retro-reflective	Diffuse-reflective
Cable type	NPN	ZT-L3000N	ZR-L1000N	ZD-L40N
	PNP	ZT-L3000P	ZR-L1000P	ZD-L40P
M8 connector type	NPN	ZT-L3000CN	ZR-L1000CN	ZD-L40CN
	PNP	ZT-L3000CP	ZR-L1000CP	ZD-L40CP
Supply voltage		DC10～30V Inc. 10% ripple		
Power consumption		30mA max.	20mA max.	
Sensing distance		30meter	10meter (Reflector : P250F)	400mm
Spot size		30mm/30m	10mm/8m	2mm/400mm
Response time		250μsec		
Hysteresis		–		20% Max
Operating temp		–10 to +50℃		
Operating humidity		35 to 85%		
Storage temp / humidity		–25 to +70℃/35 to 95%		
Vibration resistance		10 to 55Hz width 1.5mm		
Shock resistance		50 G (500 m/s²)		
Protection category		IP67		
Light source		Laser (650nm)		
Laser class (IEC)		class 1	class 2	
Laser class (FDA)		class Ⅰ	class Ⅱ	
Output indicator		Orange(Yellow) LED		
Laser power indicator		Green LED		
Sensitivity adjustment		Single turn potentiometer		
Operating mode		Light On / Dark On selectable (switch)		
Connection		2m cable / M8 connector		

BGS - Laser Type

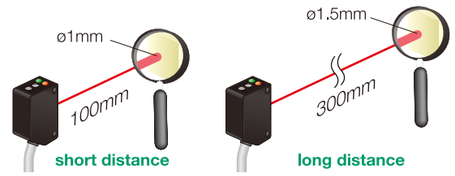
Fine spot / high speed applications

- ***BGS (Background Suppression Type) Sensors are not influenced by the background, available with conventional Laser light source.***
- ***250 μsec fast response (Laser light source models)***
- ***1 mm projected spot size with BGS optical system (BGS-ZL Laser types)***

Features

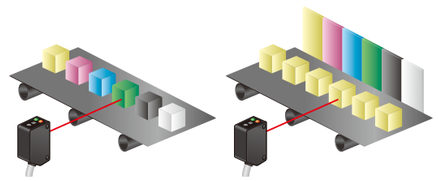
1 mm projected spot size

The Short distance BGS Laser sensor projects a very small ø1 mm spot at 100 mm distance.
Ideal for the detection of small targets at long distance without being influenced by the background. The Long distance type projects a ø1.5 mm spot at 300 mm.



BGS optical system designed with Laser light source

Extremely small BGS type sensors are only 17 x 10 x 20mm. Ideal for use in OEM equipment such as Printed Circit Board processing machines.



External control of Laser Beam

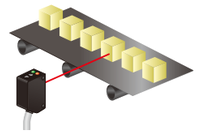
External control of laser OFF is possible by connecting gray wire to GND (NPN type) or DC10-30V (PNP type).
(This function is not available in 3 pin types)

4 Turn adjustment pot.

A four turn adjustment pot. is built-in for precise adjustment of the sensing distance.
The potentiometer has a slip clutch that protects it from damage when it is turned past the end.

250μsec response

Good for fast moving objects.



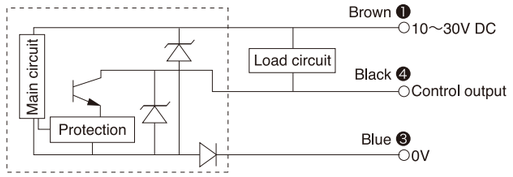
Specifications

Model		long distance		short distance	
		2m Cable	M8QD 4pin	2m Cable	M8QD 4pin
Type	NPN	BGS-ZL30N	BGS-ZL30CN	BGS-ZL10N	BGS-ZL10CN
	PNP	BGS-ZL30P	BGS-ZL30CP	BGS-ZL10P	BGS-ZL10CP
Adjustable distance		50 - 300 mm (*1)		20 -100 mm (*1)	
Sensing distance		10 - 300 mm (*1)		5 -100 mm (*1)	
Response time		250μs			
Spot size		ϕ1.5mm/300mm		ϕ1mm/100mm	
Hysteresis (white to white)		5%		3%	
Operating mode		Light On / Dark On selectable			
Output indicator		Output : orange, Laser Power : green			
Sensitivity adjustment		4-turn, endless pot.			
Control output		NPN or PNP open collector, 100mA max / DC30V			
Supply voltage		DC 10 - 30V, including 10% ripple			
Power consumption		30mA max			
Protection category		IP 67			
Shock resistance		50G			
Operating temp / humidity		–10 to 55℃ / 35 to 85% RH			
Materials		Housing : ABS with glass, Lens : PMMA			

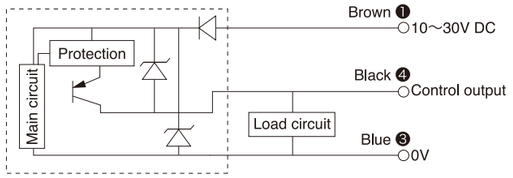
*1 white paper 100 X 100mm "M8-QD in 3 pins for European machines " are available with extention code of -CN(P)3, for instance, "BGS-ZL30CN3".

Circuit diagram

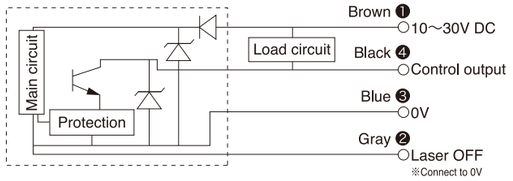
NPN output thru-beem receiver



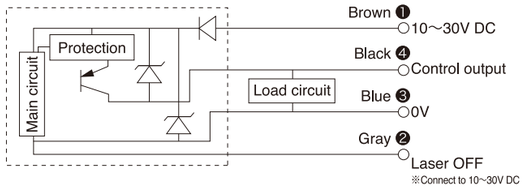
PNP output thru-beem receiver



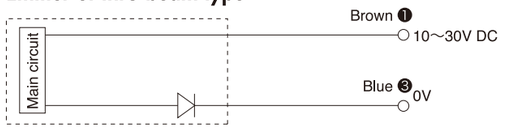
NPN output（other type）



PNP output（other type）

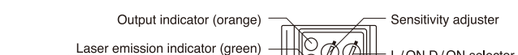


Emitter of thru-beam type

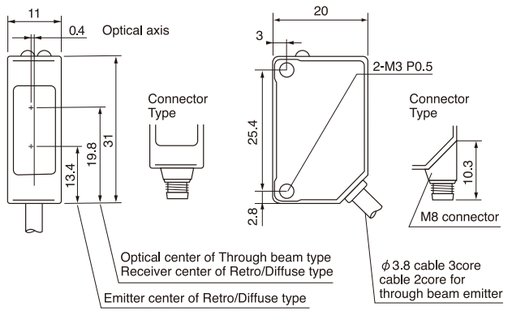


Dimensions

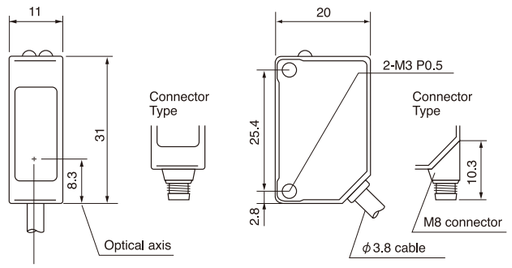
General use type except BGS



Remark : ZR-QX type (coaxial beam for transparent detection) has single LED (orange for output indicator).



BGS type



<Cable>
Brown : DC10～30V
Blue : GND
Black : Control Output
Gray : Laser OFF (Laser type only)
(NPN connect to GND / PNP connect to DC10～30V)

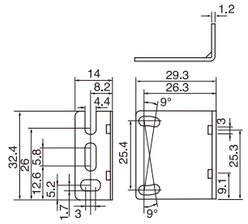
<3 Pin configuration>

① DC10～30V
② GND
③ Control Output

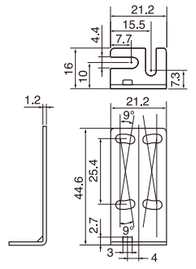
<4 Pin configuration>

① DC10～30V
② Laser OFF (Laser type only)
(NPN connect to GND / PNP connect to DC10～30V)
③ GND
④ Control Output

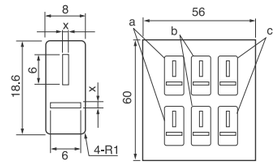
Standard bracket BEF-W-100-A
For M8 QD type sensors



Standard bracket BEF-W-100-B
For cabled type sensors

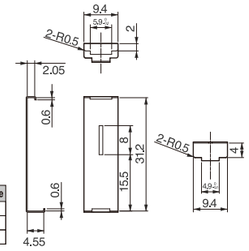


Slit mask BL-160-SK (for thru-beam type)



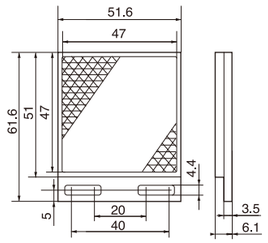
Type	Size	Attached to	Object size (Min)	Scanning range
Slit a	0.5mm	Receiver,Emitter	0.4mm	0.8mm
Slit B	1mm	Receiver,Emitter	0.6mm	2.5mm
Slit C	2mm	Receiver,Emitter	1.5mm	5mm

Slit mask BL-100-M1

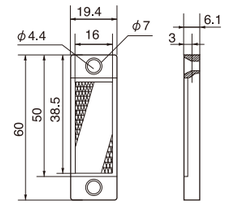


Reflectors for laser type

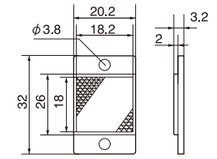
P250F
(Standard, 0.2-10m)



PL20F
(Optional, 0.2-8m)



PL10F
(Optional, 0.2-7m)



(Unit : mm)

Options

P250F

PL20F

PL10F

JCN-S：M8 Straight type

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

JCN-L：L-shape M8 type

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

Protective mounting brackets
LK-S01

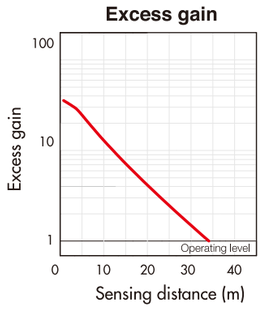
LK-S02

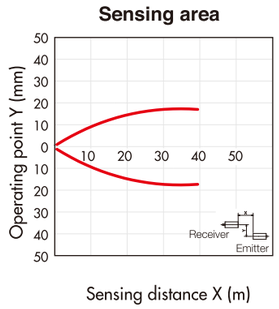
Sensor stand
PLN-1

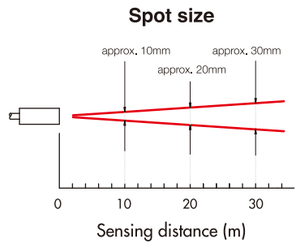
Fixture of Reflector
PLN-1M

Reference (typical)

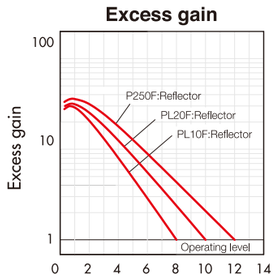
ZT-L3000N

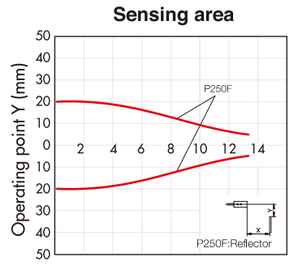


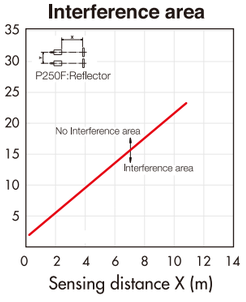


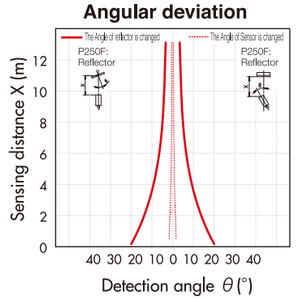


ZR-L1000

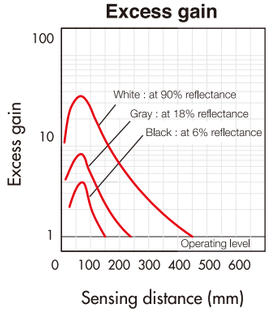


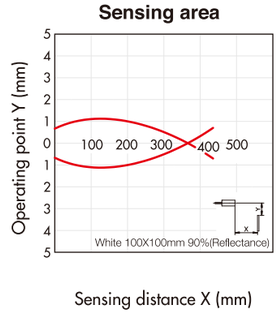


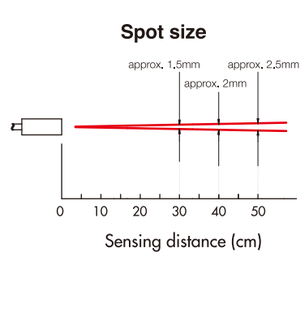




ZD-L40

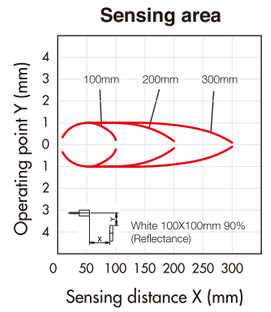


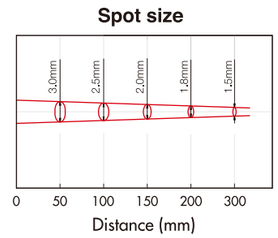


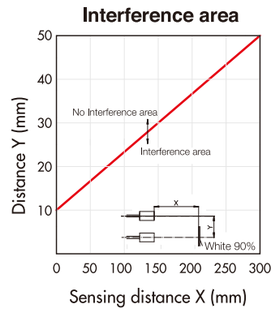


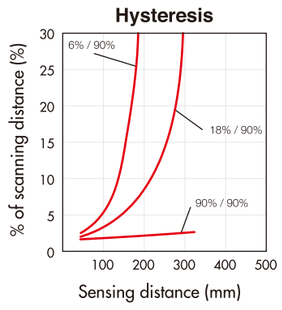
Reference (typical)

BGS-ZL30N

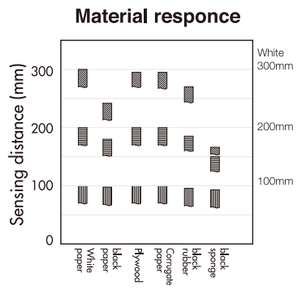


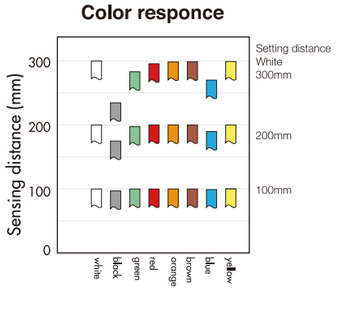




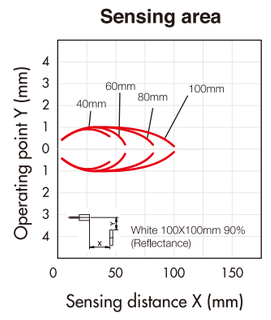


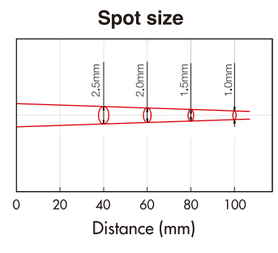
White 90% (KODAK White)
Gray 18% (KODAK Gray)
Black 6% (POTOWAND 4606)

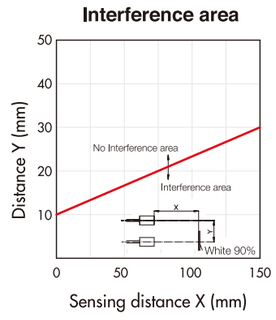


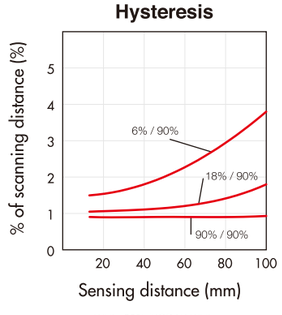


BGS-ZL10N

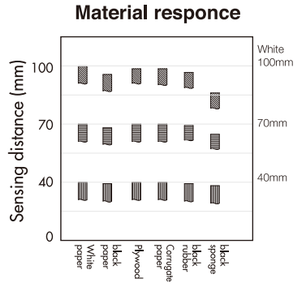


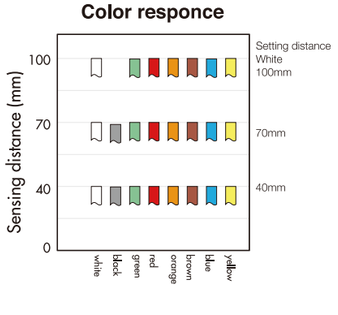






White 90% (KODAK White)
Gray 18% (KODAK Gray)
Black 6% (POTOWAND 4606)





FIBER SENSOR

FIBER SENSOR

All Optex-FA fiber optic sensors are designed for high performance and ease of use.
From models with digital display and pushbutton teach to manual adjust there is an amplifier to solve your application.
All amplifiers are available in Cabled or M8 QD versions and are offered with a choice of NPN or PNP outputs.

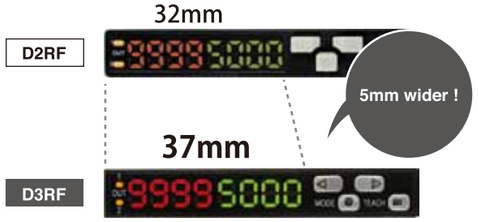
High speed digital fiber sensor

D3RF series

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

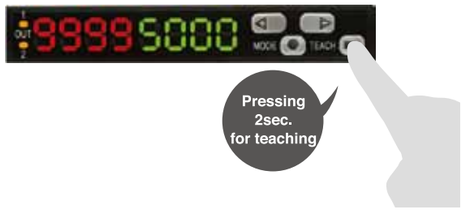
Widest display in the class

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



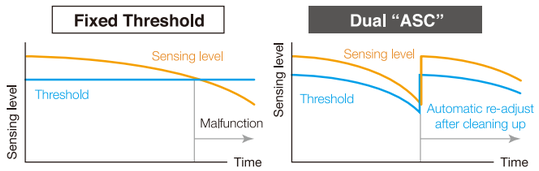
Easier operation

Basic setup is as easy as pressing the teach button for 2 seconds. More advanced functions are located in a deeper setup layer for solving more complex applications.



Dual "ASC" for easy maintenance

Detects light degradation due to dust or other debris and adjusts the brightness. It re-adjusts the threshold automatically after cleaning so there is no need for re-teaching.

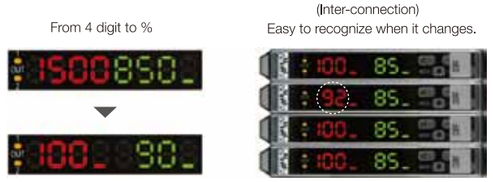


The returned light level decreases as contamination builds up. Once this sensing level drops below the threshold level the sensor needs to be re-taught.

The sensor continuously monitors the received light level and automatically adjusts the threshold to the optimum level.

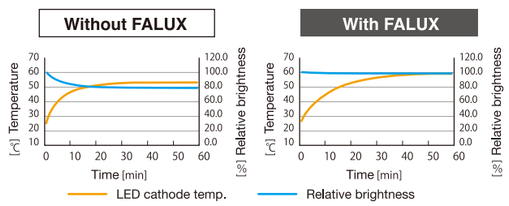
100% display for better recognition of change

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



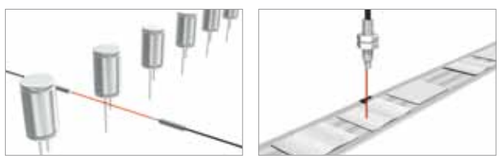
Brightness stabilizing function "FALUX"

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



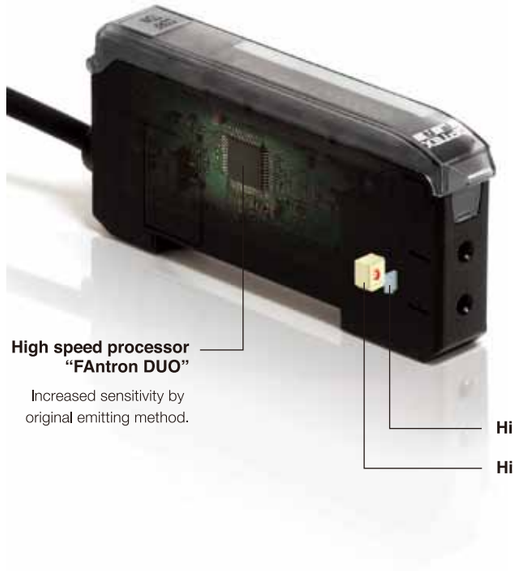
Adjustable hysteresis

Hysteresis can be adjusted from 1% to 40%. This enables the sensor to be optimized for detecting slight differences in parts or applications with a lot of vibration.



Detecting parts leads

Detecting sheet objects



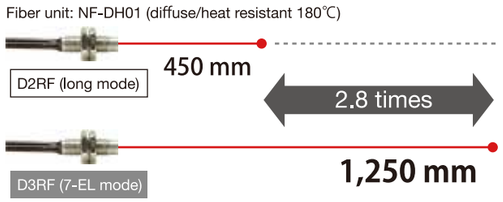
Fastest in the class
16μs(1-HS mode)
22μs(inter-connection type)

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 effective collective lens, the D3RF series has an increased sensing distance of up to 3 times longer for diffuse and 5 times longer 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

ECO mode enables power saving by turning off the sub-display (green) and by dimming the 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

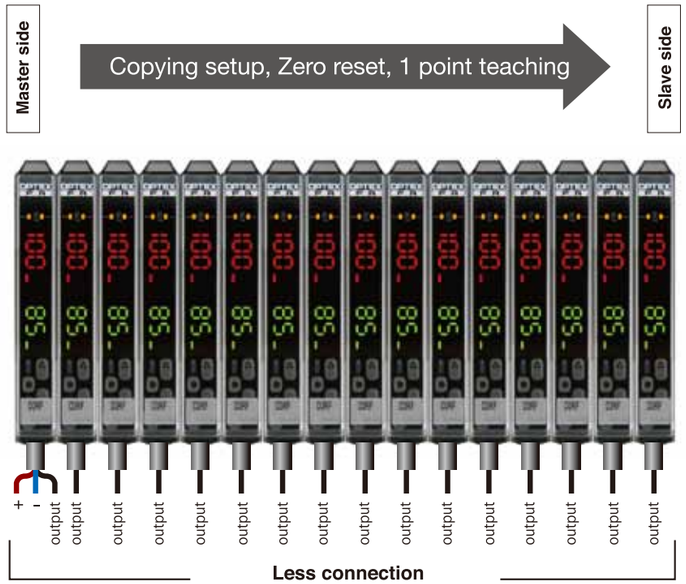
D2RF	D3RF
8 units	16 units (cross talk prevention: OFF or ECO mode)

Cross talk prevention

The D3RF can prevent cross talk by shifting the timing of the emitting element. You can connect up to 12 units in standard mode and up to 16 units in ECO mode.

Easy setup

The interconnect version of the D3RF can copy the setup parameters from the master side to the slave slide. Zero reset and 1 pt teaching can also be performed simultaneously to each unit.

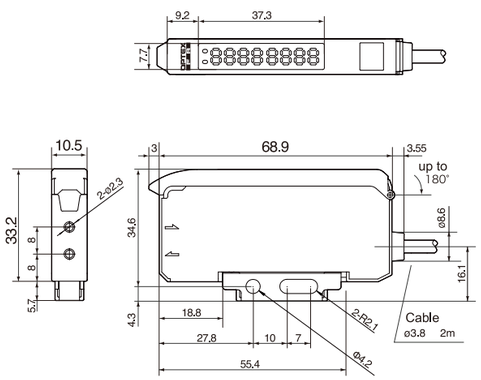


ex.) 18 wires for 16 units inter-connection (1ch output)

Dimensions

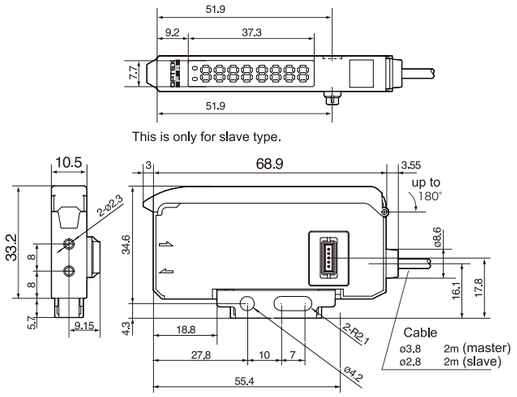
Single type

D3RF-TN/TDN or TP/TDP
D3IF-TN or TP



Interconnection type

D3RF-TMN/TDMN or TMP/TDMP (master)
D3RF-TSN/TDSN or TSP/TDSP (slave)



Specifications

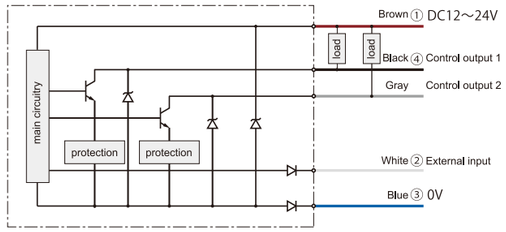
Model		Single type	Inter-connection type - master	Inter-connection type - slave	IR type
Cable type	1 output type (NPN/PNP)	D3RF-TN / TP	D3RF-TMN / TMP	D3RF-TSN / TSP	D3IF-TN / TP
	2 output type (NPN/PNP)	D3RF-TDN / TDP	D3RF-TDMN / TDMP	D3RF-TDSN / TDSP	-
M8 QD type	1 output type (NPN/PNP)	D3RF-TCN4 / TCP4	D3RF-TMCN4 / TMCP4	D3RF-TSCN4 / TSCP4	D3IF-TCN4 / TCP4
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 0.1ms~9.999s			
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)			
Conformity		CE, IEC			
Operating temp./humid.		-25~+55°C *4 / 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.

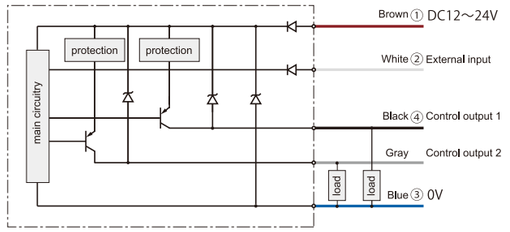
Interconnection type

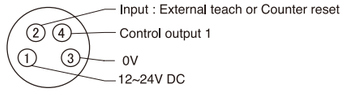
Circuit diagram

NPN output



PNP output

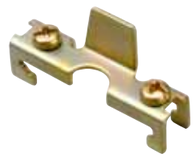




Options

BEF-EB01-W190

End plate



JCN-S : M8 Straight type

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

JCN-L : M8 L-shape type

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

Digital Fiber Sensor

D2RF series

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

6 teach methods for individual applications

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

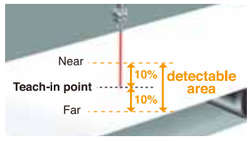
Full automatic Teaching
Set while the equipment is operating.

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.



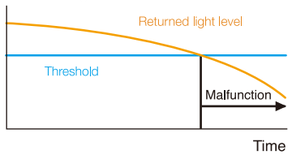
SAM Circuit - The ASC function (Auto Sensitivity Control)

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.

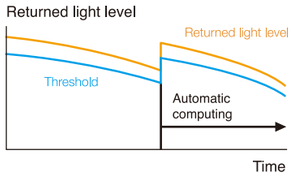
After cleaning off the lens / reflector it used to be necessary to reset the threshold setting. The D2RF does not require this step. Simply clean off the lens and wait three seconds without a target present. The sensor will automatically reset the threshold level for the change. This is how the SAM circuit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

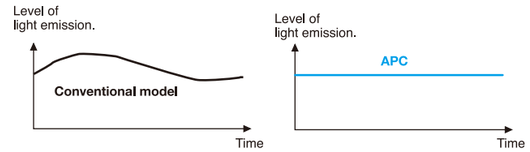


D2RF series
SAM Circuit
The threshold will auto-matically return to the preset level after the lens is cleaned off.



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.

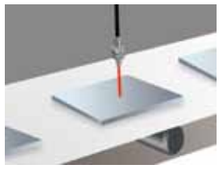
Both outputs can be set to operate at this speed.
This response time is available in 5 of the teach modes.

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.

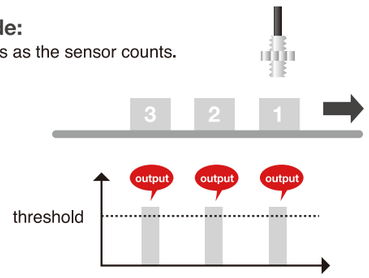
Automatic Tuning

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.

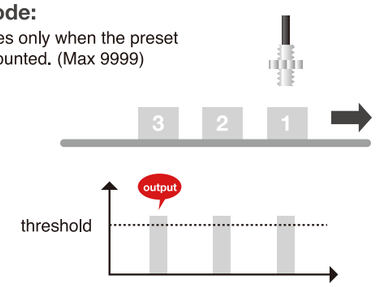
Counter Mode

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)



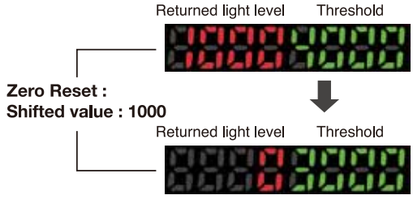
Edge Sensing

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

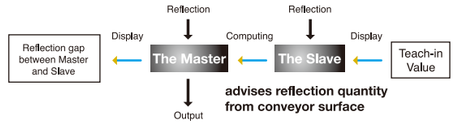
The sensor display can be reset to zero. This is useful for adjusting the display's of the Master and Slave units to read the same. It is also good to set the value to zero when the light is interrupted.



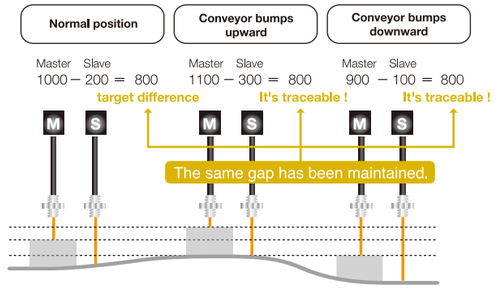
Differential Sensing Mode

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:

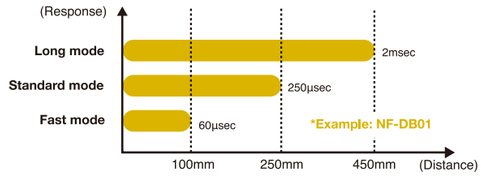


How to follow the changing condition!



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.



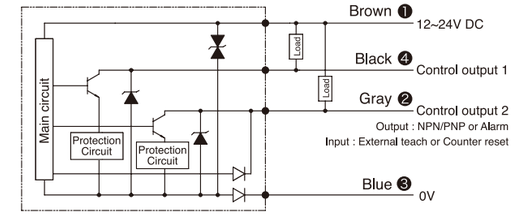
Long mode

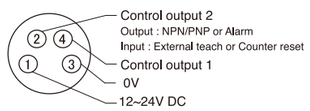
Standard mode

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.

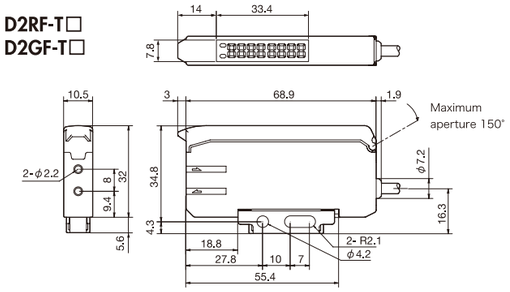
External Teach Input (CH2)

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)

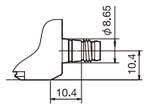
Dimensions

Stand-alone model

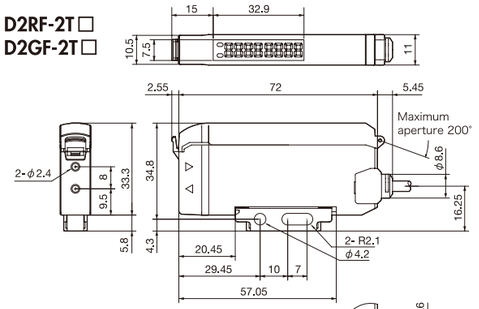
D2RF-T□
D2GF-T□



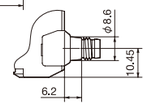
D2RF-TC□4
D2GF-TC□4



D2RF-2T□
D2GF-2T□

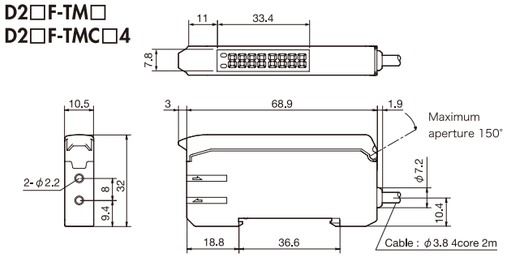


·D2RF-2TC□3/4
·D2GF-2TC□3/4

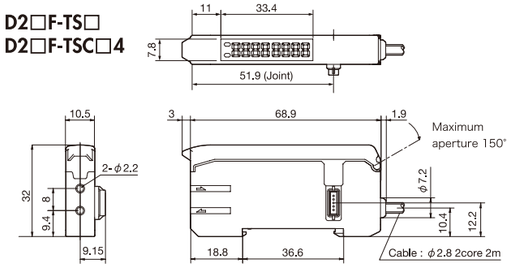


Interconnection model

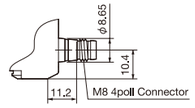
D2□F-TM□
D2□F-TMC□4



D2□F-TS□
D2□F-TSC□4

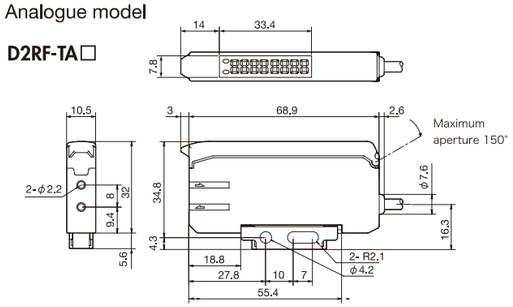


·M8 Connector type

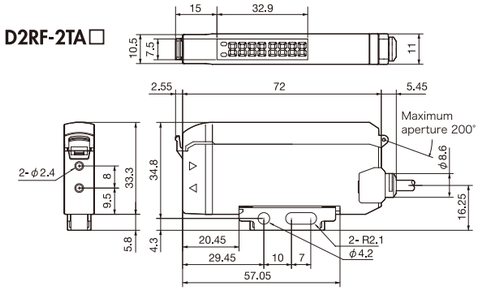


Analogue model

D2RF-TA□



D2RF-2TA□



Specifications

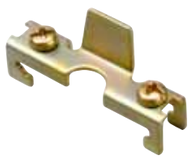
Model		Standard	Mark sensor	Analogue
Stand-alone Type				
IP50 type	Cable type NPN / PNP	**D2RF-TN / TP**	**D2GF-TN / TP**	**D2RF-TAN / TAP**
	M8 QD 4pin, NPN / PNP	**D2RF-TCN4 / TCP4**	**D2GF-TCN4 / TCP4**	**NA**
IP66 type	Cable type NPN / PNP	**D2RF-2TN / 2TP**	**D2GF-2TN / 2TP**	**D2RF-2TAN / 2TAP**
	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°C, 35 to 85% RH		
Storage temp / humidity		–40 to 70°C, 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°C when amplifires are connected in parallel over 4 pcs.

Options

BEF-EB01-W190

End plate



JCN-S : M8 Straight type

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

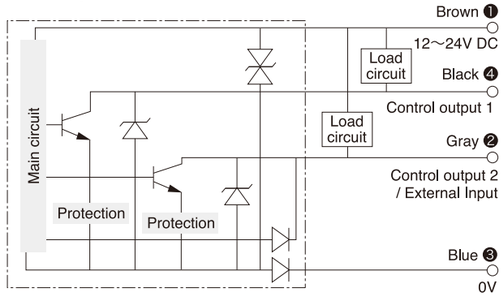
JCN-L : M8 L-shape type

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

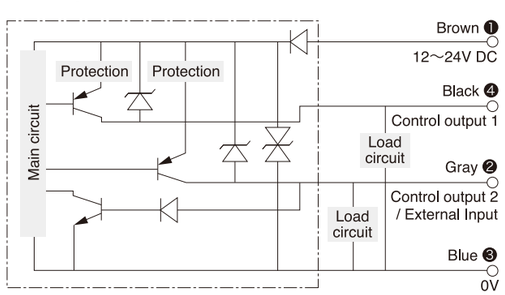
Circuit diagram

Stand-alone model

NPN output

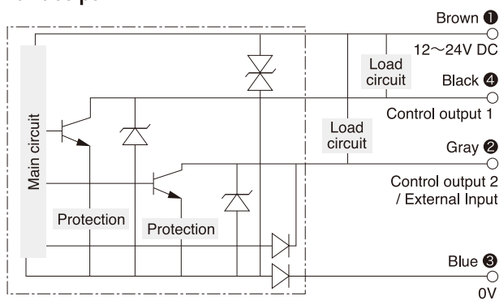


PNP output

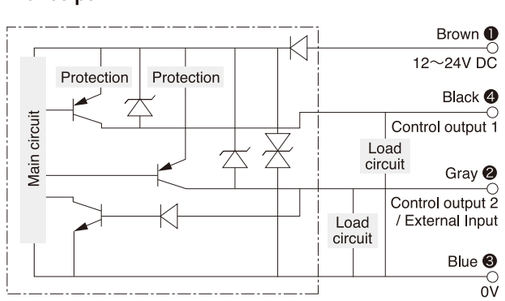


Interconnection model

NPN output



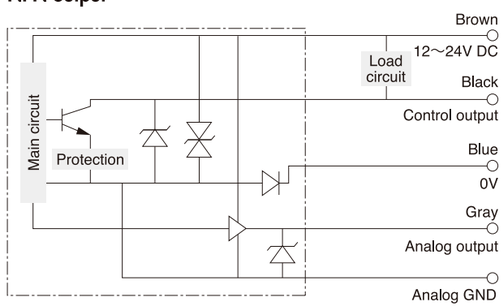
PNP output



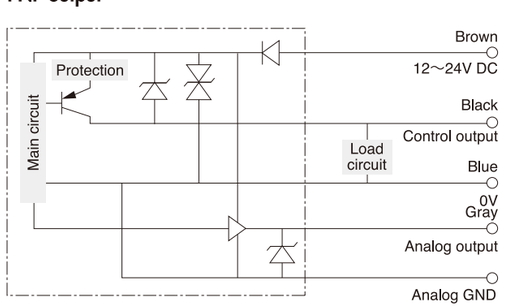
・Power wires (Brown ❶, Blue ❸) are not attached to Handset unit, both on cable and connector type.

Analogue model

NPN output



PNP output

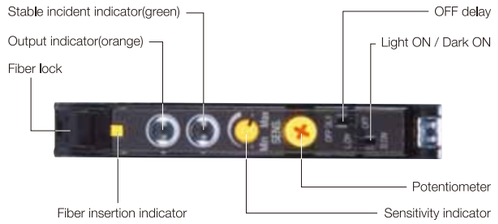


Fiber Sensor

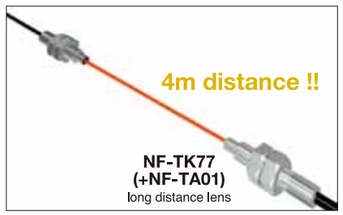
BRF series

- 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.

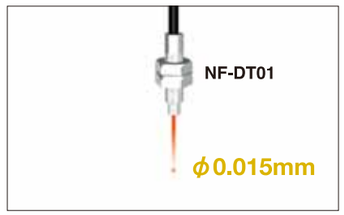
Part Identification



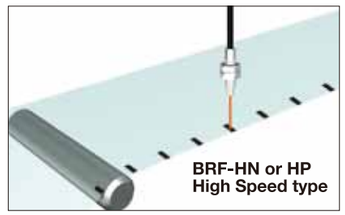
Long distance sensing



Min object ϕ0.015mm

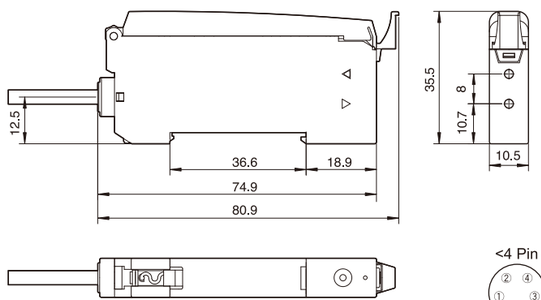


High Speed response 50μsec

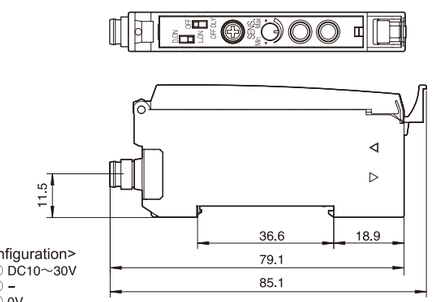


Dimensions

Cable Type Stand-alone



M8 Connector Stand-alone

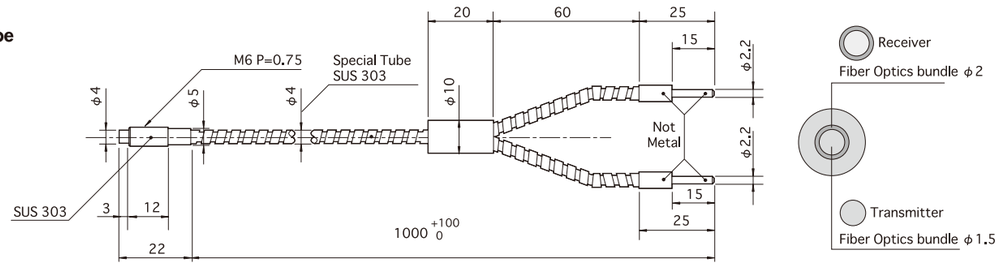


<4 Pin configuration>
① DC10~30V
② –
③ 0V
④ Control Output

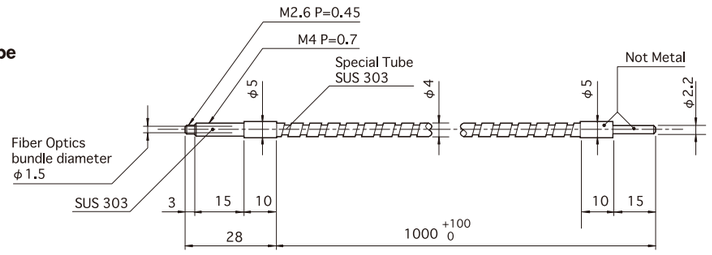
(Unit : mm)

Dimensions

NF-DW01
Diffuse Type



NF-TW01
Thru-beam Type



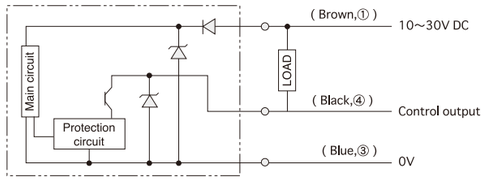
Specifications

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	150mm	50mm	40mm	30mm Diffuse
	DK-06 Diffuse Fiber				100mm Thru-beam
Response time		250 μs	50 μs	250 μs	1ms
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			

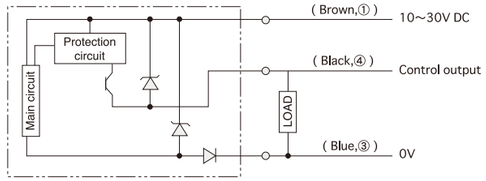
* 1 See NF series Fiber optics.

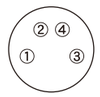
Circuit diagram

NPN output



PNP output





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

Options

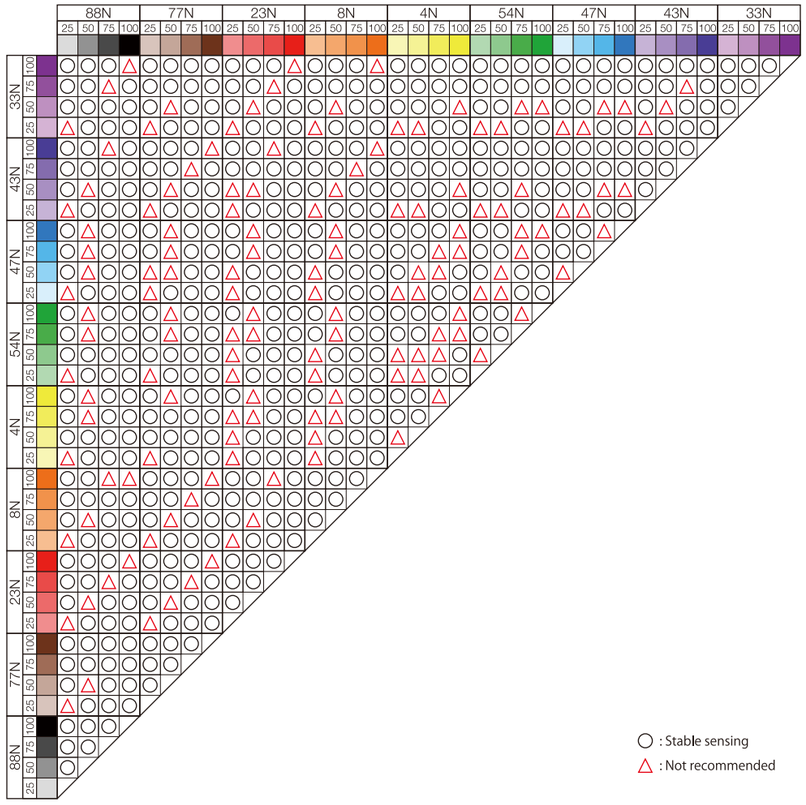
JCN-S : M8 Straight type

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

JCN-L : M8 L-shape type

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

Sensing Chart by colours (BGF series Mark Sensor)

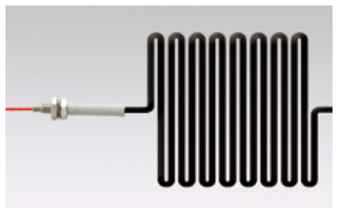


Fiber unit NF series

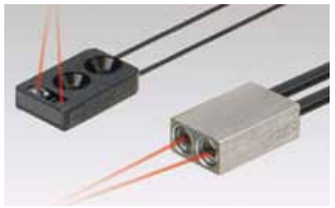
A complete fiber optic sensor consists of the amplifier and a fiber optic cable.
The fiber optic cable is chosen based upon the specific application.
Optex-FA offers more than 80 different cables in both Thru-beam and Diffuse sensing modes.

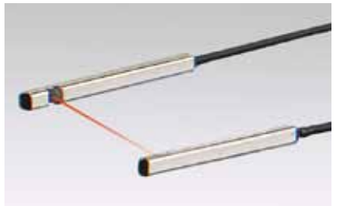
Various shapes for mounting

Tight Bend / High-Flex



Various Detecting Modes





Environment-resistant

Liquid

Extension lens

Fiber Sensor

Alphabetical Index

EASY MOUNTING

Flexible mounting configurations and space saving installations

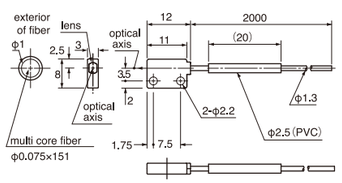
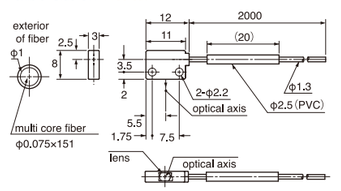
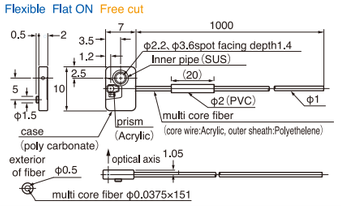
All in one top and side sensing

The Fiber can easily be adjusted for front or side sensing reducing inventory. The fiber also has a 1mm bending radius that improves mounting flexibility.

Top, side and front sensing type

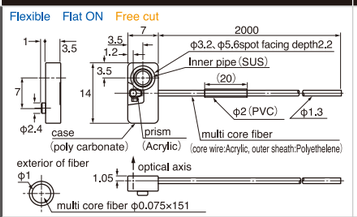
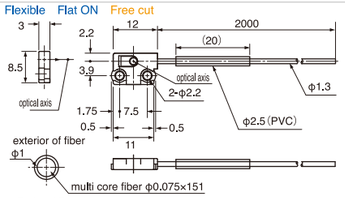
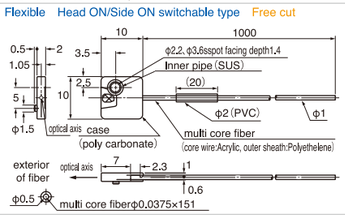
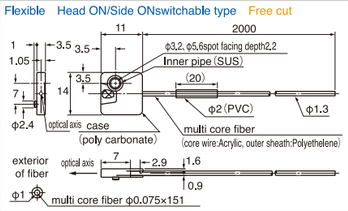
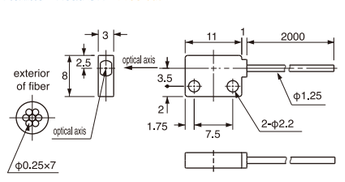
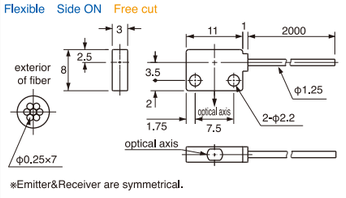
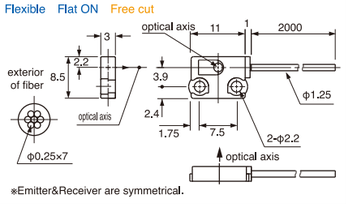
You can choose from top, side, and front sensing versions.
You can also choose between R1mm and R4mm versions.

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

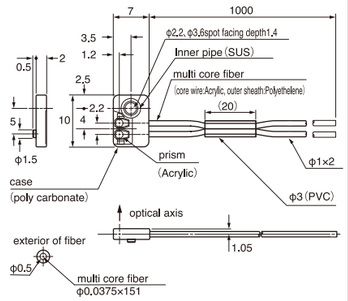
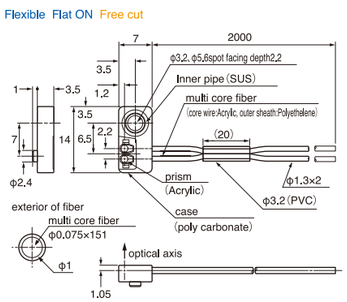
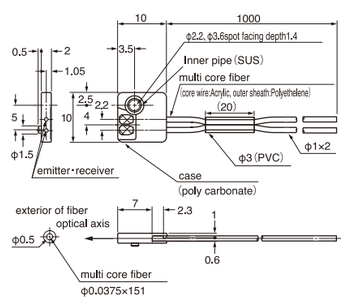
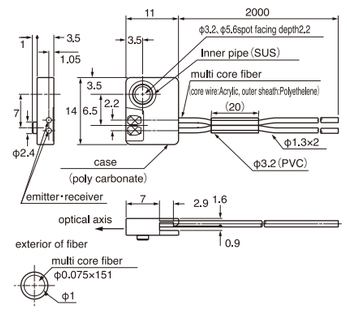
Operating humidity is 35~85%RH. Please use in 0~40℃ when it's 85%RH

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℃ 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℃ when it's 85%RH.
Sensing distance of diffuse type is for 500 x 500mm white paper.

THREAD TYPE

M3, M4, and M6 threaded versions with lock nut for easy mounting. Optional lenses provide longer sensing distances of smaller objects.

Space saving

The NF25-T and NF25-D have right angled heads to save space when installed. Heat resistant and R2 mm flexible types are available.

Straight type

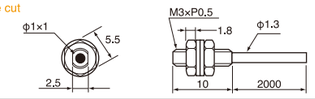
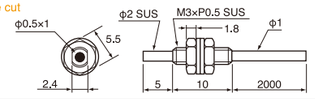
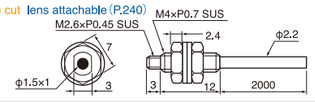
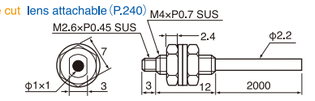
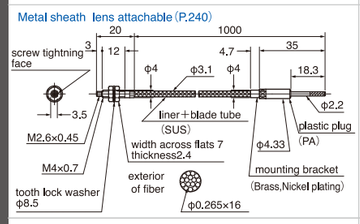
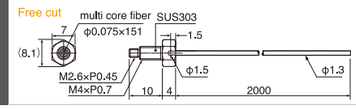
Nut type

Metal Sheath type

Stainless steel braid protects the fiber cable and prevents fiber cable breakage due to snagging. The R10mm allows the cable to bend in tight areas without breaking.

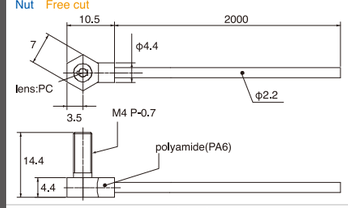
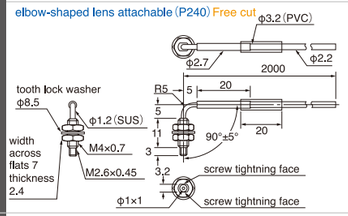
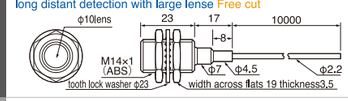
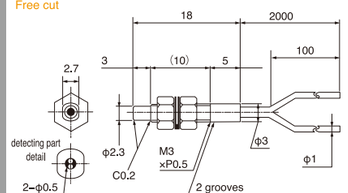
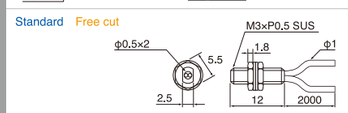
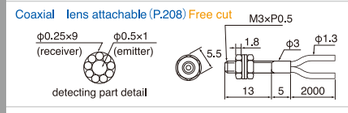
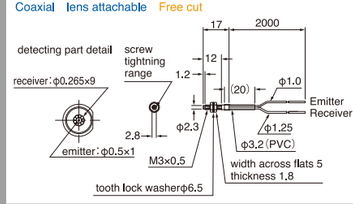
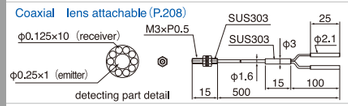
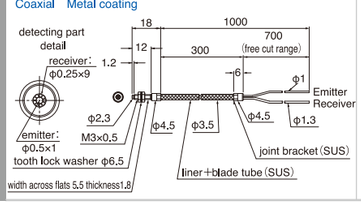
Metal sheath type

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.240) 	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.240) 	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.240) 	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
		Free cut 	7-EL 3,800 6-UL 2,700 5-PL 2,200 4-LG 1,800 3-ST 1,200 2-FS 800 1-HS 300	—	400	−40～60	R=2	NF-TR14

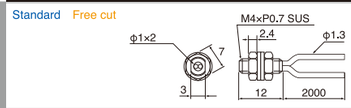
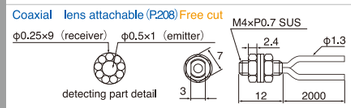
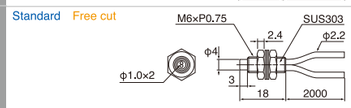
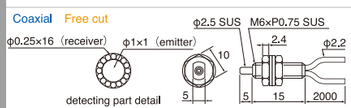
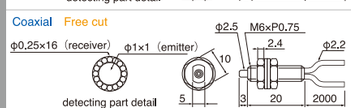
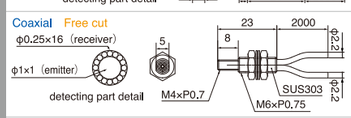
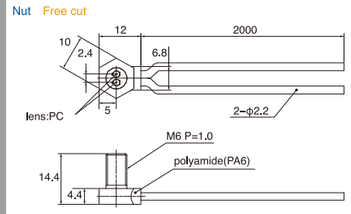
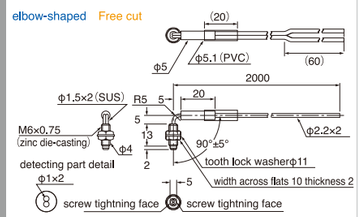
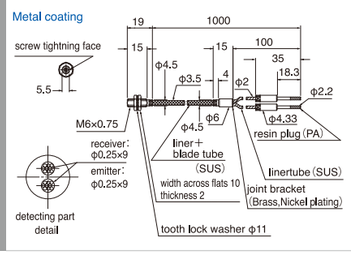
Operating humidity is 35~85%RH. Please use in 0~40℃ when it's 85%RH.

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 (P240) 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.208) 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 lens attachable 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.208) 	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℃C when it's 85%RH.
Sensing distance of diffuse type is for 500 x 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 (P208) 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
	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℃C when it's 85%RH.
Sensing distance of diffuse type is for 500 x 500mm white paper.

CYLINDRICAL TYPE

Smooth Barrel space saving fiber optic sensor. Install with set-screw.

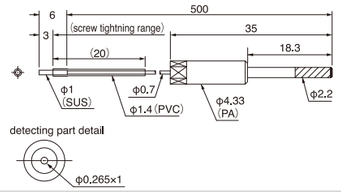
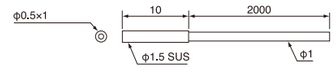
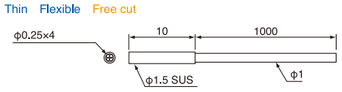
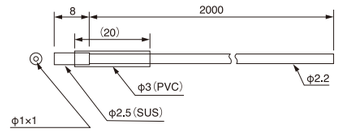
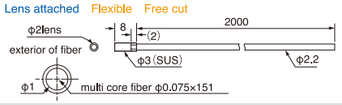
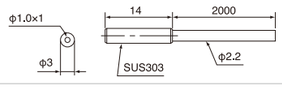
Three types to choose from

Super narrow type

Side beam type

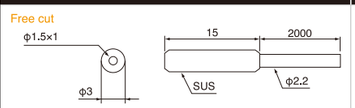
Sleeve type

Specifications (Thru-beam Type : Standard)

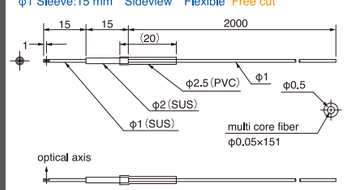
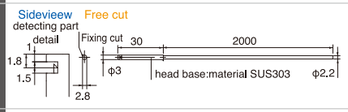
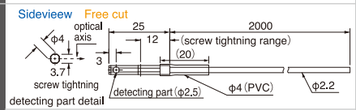
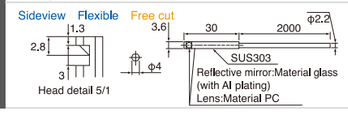
		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam	φ1	Thin Flexible 	7-EL 54 6-UL 50 5-PL 44 4-LG 38 3-ST 25 2-FS 15 1-HS 5	Long 30 Std 18 Fast 8	10	−40～60	R=4	NF-TR04
	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℃ when it's 85%RH.

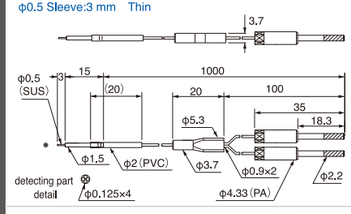
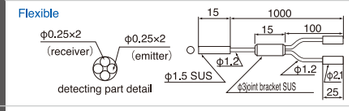
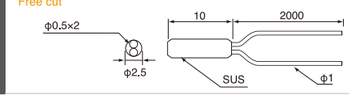
Specifications (Thru-beam Type : Standard)

		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)

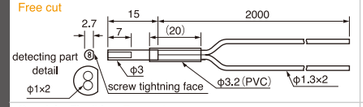
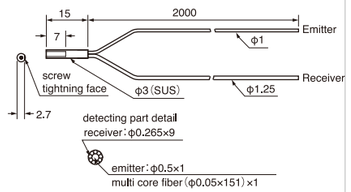
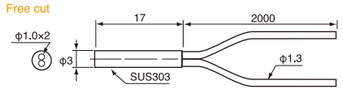
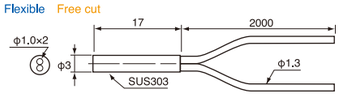
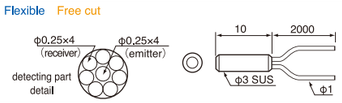
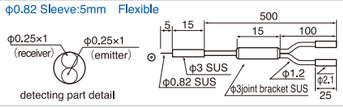
		Sensing head	Sensing distance (unit=mm) Value in parenthesis is the Minimum detectable object size. (copper wire) D3RF	D2RF	BRF	Operation temperature (℃～℃)	Radius (mm)	Part Number
Thru-beam Side	φ2	φ1 Sleeve:15 mm Sideview Flexible Free cut 	7-EL 160 6-UL 150 5-PL 130 4-LG 110 3-ST 76 2-FS 45 1-HS 11	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

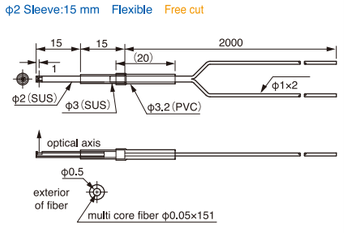
Operating humidity is 35~85%RH. Please use in 0~40℃ when it's 85%RH.
Sensing distance of diffuse type is for 500 x 500mm white paper.

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℃ when it's 85%RH.
Sensing distance of diffuse type is for 500 x 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℃ when it's 85%RH.
Sensing distance of diffuse type is for 500 x 500mm white paper.

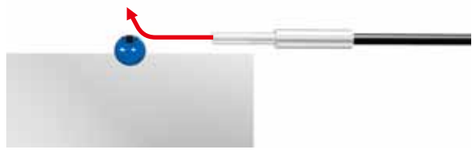
SLEEVE-STRAIGHT

Fiber sensors with small diameter sleeves are available in both threaded and smooth barrels. This provides a wide range of installation options in narrow spaces.

Flexible Mounting

Sleeve type enables position adjustment after installation.

Standard type without sleeve



Sleeve type

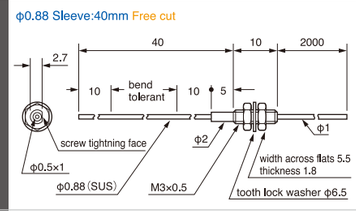
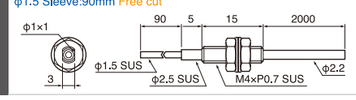
Easy position adjustment

Sleeve type allows for easy position adjustment in narrow spaces without affecting existing installation.

Without sleeve

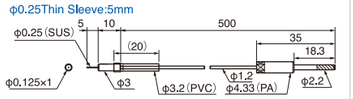
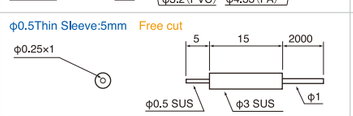
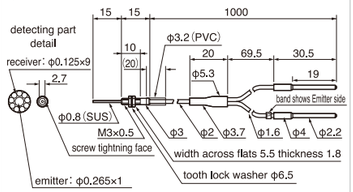
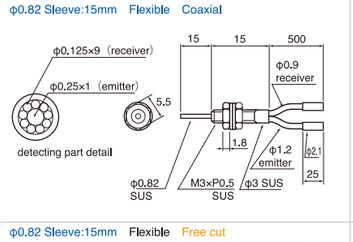
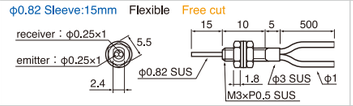
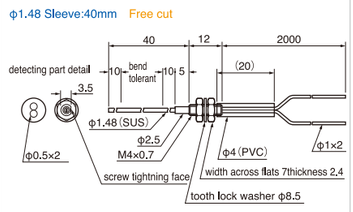
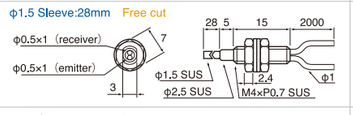
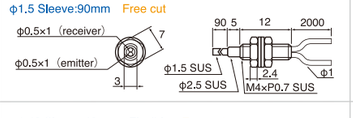
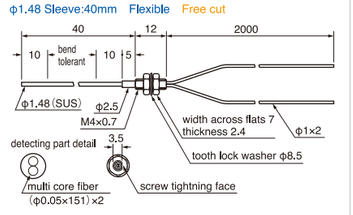
Sleeve type

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

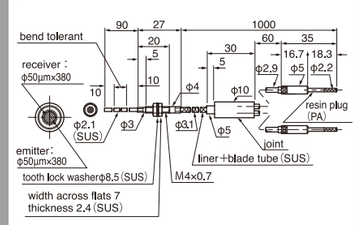
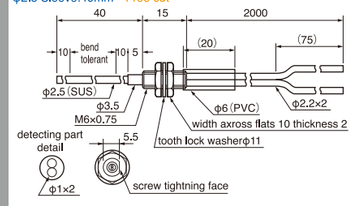
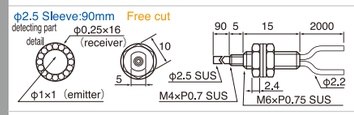
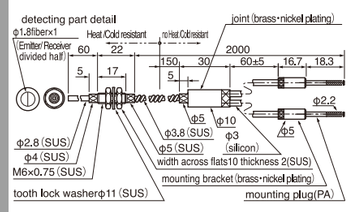
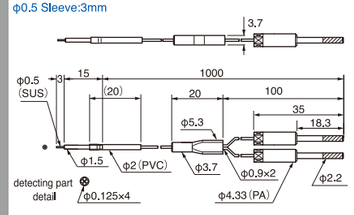
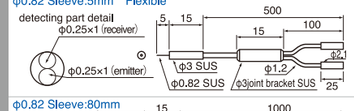
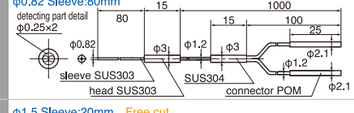
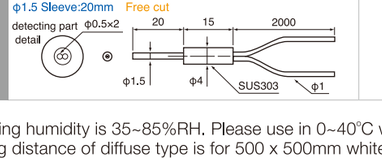
Operating humidity is 35~85%RH. Please use in 0~40℃ when it's 85%RH.

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℃ when it's 85%RH.
Sensing distance of diffuse type is for 500 x 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℃ when it's 85%RH.
Sensing distance of diffuse type is for 500 x 500mm white paper.

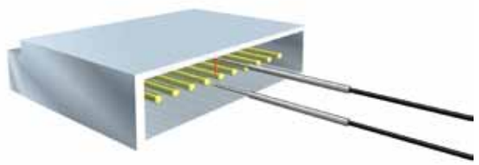
SLEEVE-SIDEVIEW

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

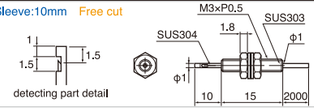
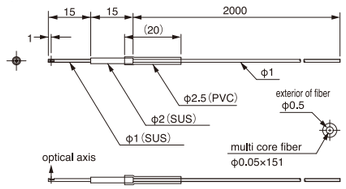
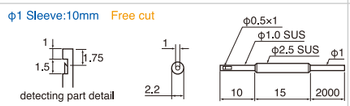
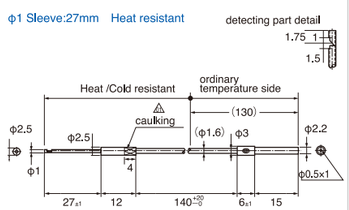
You can detect objects in narrow area.

Sleeve-Side beam type enables installation in very narrow complicated objects. For example, it can detect very small pins in a connector.

Pins in a connector housing.

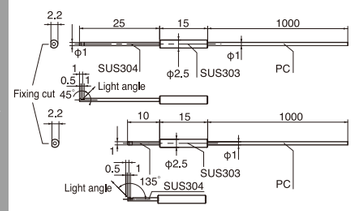
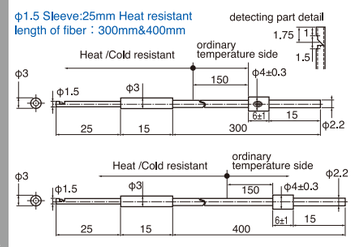
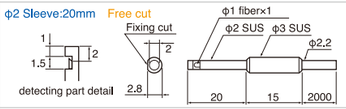
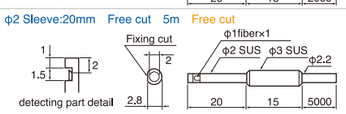
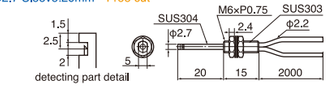
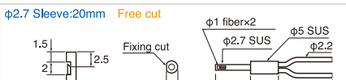
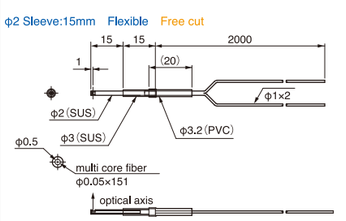
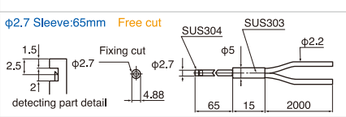


Specifications (Thru-beam Type : Sideview)

		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℃ 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
Thru-beam	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 5m 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
Diffuse	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℃ when it's 85%RH.
Sensing distance of diffuse type is for 500 x 500mm white paper.

FLEXIBLE R4mm

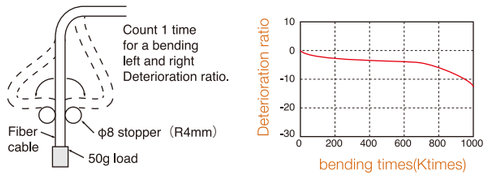
You can mount this flexible fiber unit on a robot arm that moves continuously.

Withstands over 800,000 flexes in bending test.

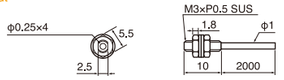
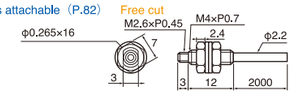
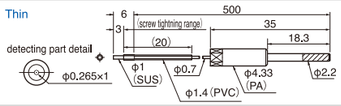
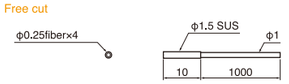
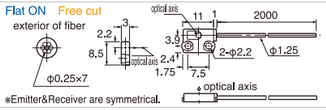
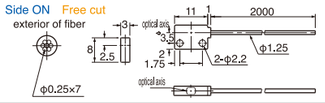
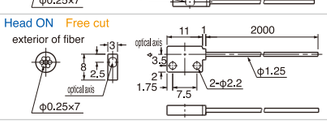
Fiber cable only shows 10% deterioration even after 800,000 flexes in the bending tests at 90 dgree under 50g load. Good for mounting on a robot arm.

Test conditions are :

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

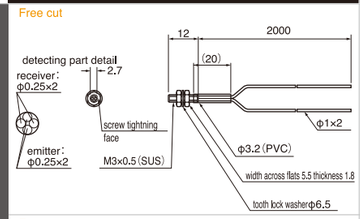
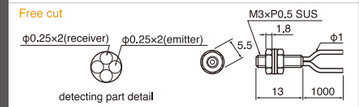
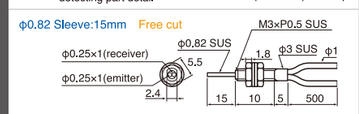
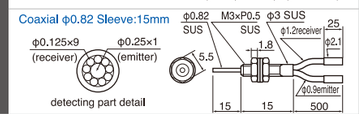
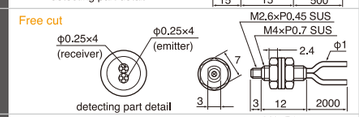
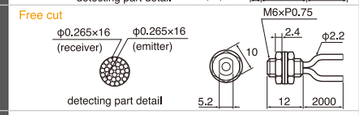
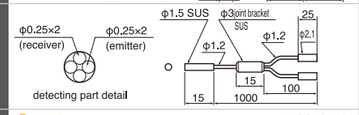
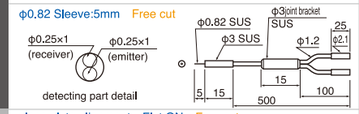
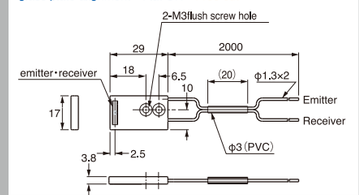
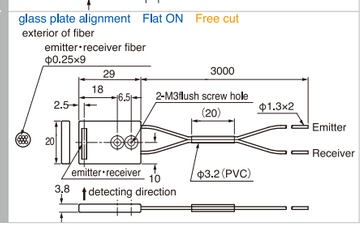


Specifications (Thru-beam)

		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
	Square	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

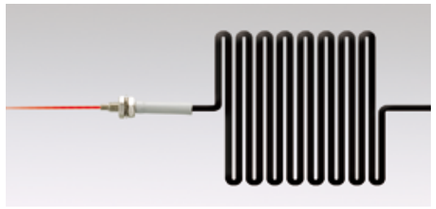
Operating humidity is 35~85%RH. Please use in 0~40℃ when it's 85%RH
Sensing distance of diffuse type is for 500 x 500mm white paper.

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		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	Doesn't work	0 ～ 70	R=4	NF-DC04

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

FLEXIBLE R1mm



Fiber designed to be placed in areas with extremely tight bending requirements.

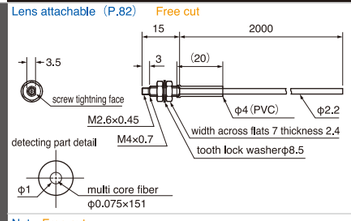
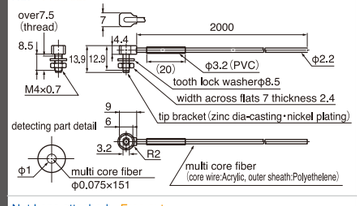
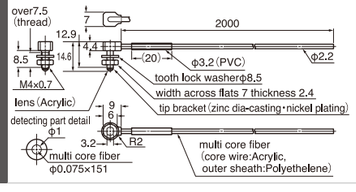
Standard fiber cable

The large bending radius requirements of the fiber may break when bent tightly.

Flexible fiber cable

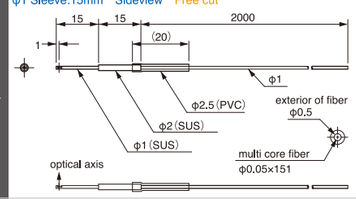
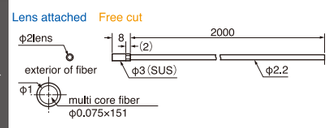
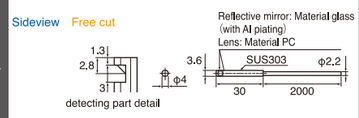
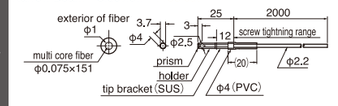
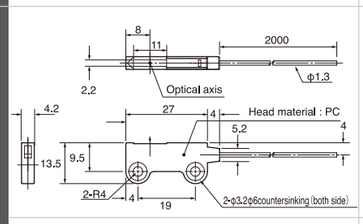
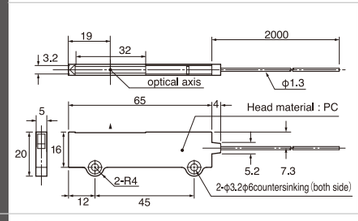
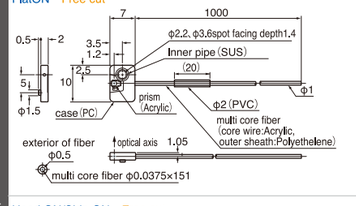
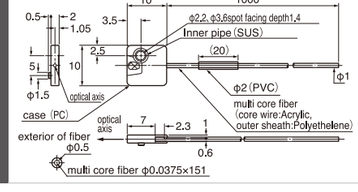
Because the fiber is very flexible it can be easily and neatly mounted in tight bending locations.

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
		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
		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 1,900 1-HS 320	Long 2,300 Std 1,300 Fast 550	800	−40～60	R=1	NF-TR09

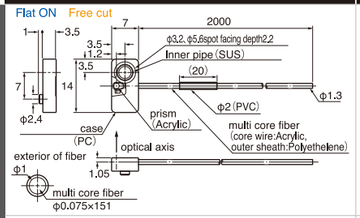
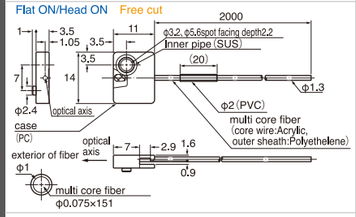
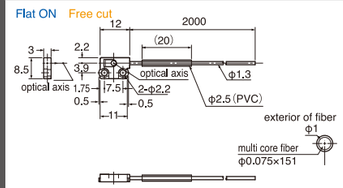
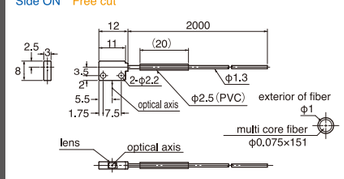
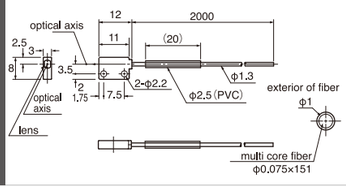
Operating humidity is 35~85%RH. Please use in 0~40℃ when it's 85%RH.

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 Reflective mirror: Material glass (with Al piating) Lens: Material PC 	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
Thru-beam	Screen		7-EL 3,700 6-UL 3,000 5-PL 3,000 4-LG 3,000 3-ST 2,500 2-FS 2,000 1-HS 1,000	Long 3,000 Std 2,500 Fast 1,200	2,000	−40～55	R=1	NF-TZ09
			7-EL 3,700 6-UL 3,700 5-PL 3,700 4-LG 3,700 3-ST 3,700 2-FS 3,000 1-HS 2,500	Long 3,700 Std 3,000 Fast 2,500	2,500	−40～55	R=1	NF-TZ07
	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

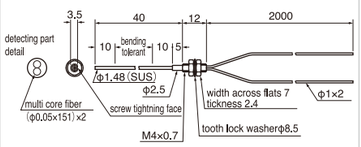
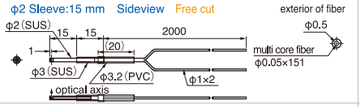
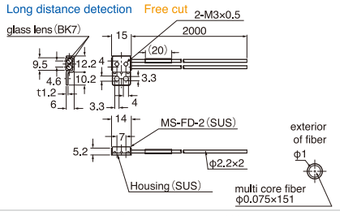
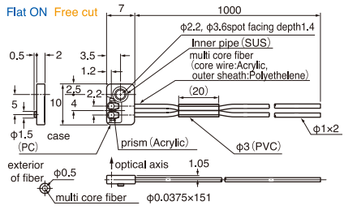
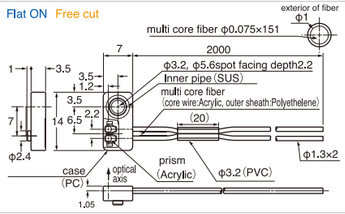
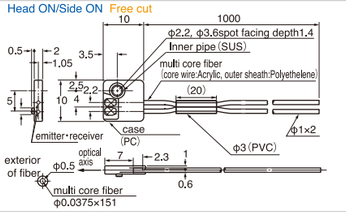
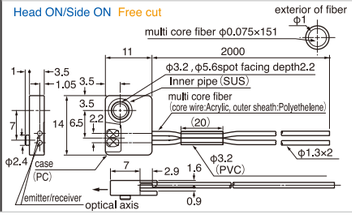
Operating humidity is 35~85%RH. Please use in 0~40℃ when it's 85%RH.

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℃ 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℃ when it's 85%RH.
Sensing distance of diffuse type is for 500 x 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

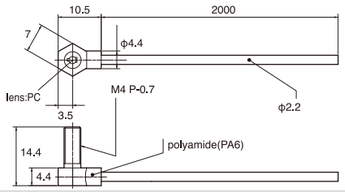
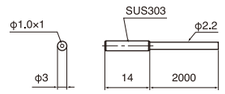
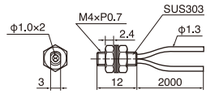
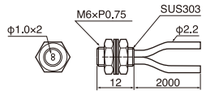
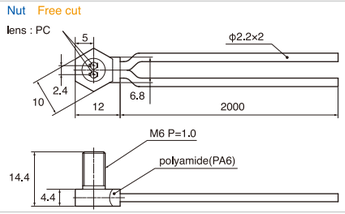
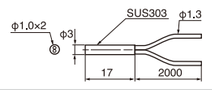
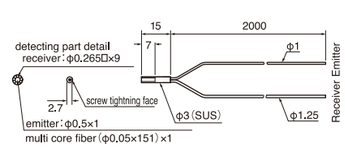
Diffuse
NF02-DK

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	M4	Free cut 	7-EL 1,200 6-UL 750 5-PL 650 4-LG 550 3-ST 400 2-FS 250 1-HS 80	Long 300 Std 180 Fast 80	110	−40～70	R=2	NF-DK66
	M6	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
	M6	Nut Free cut 	7-EL 550 6-UL 330 5-PL 230 4-LG 200 3-ST 150 2-FS 90 1-HS 18	Long 65 Std 45 Fast 10	15	−40～70	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
	φ3	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°C when it's 85%RH.
Sensing distance of diffuse type is for 500 x 500mm white paper.

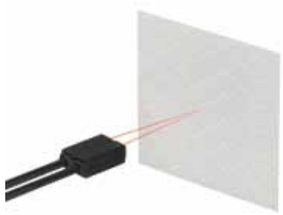
RETRO-REFLECTIVE

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

Detects transparent object

NF-RRO1 can detect transparent objects without being affected by shiny glass tilted surface because of its built in polarizing filter. Narrow view version NF-RB01 and NF-RB02 are also available.

NF-RR01



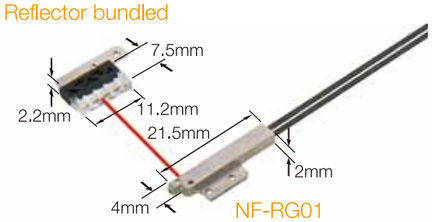
NF-RB01

NF-RB02

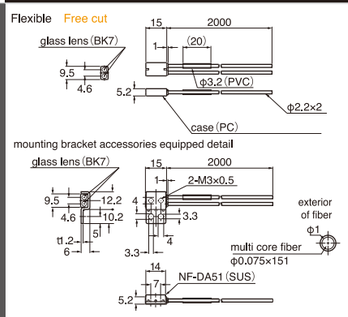
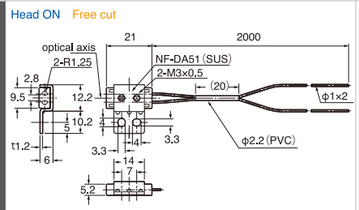
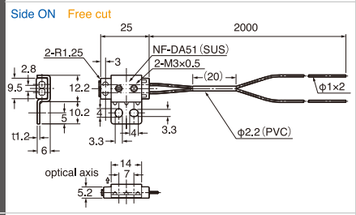
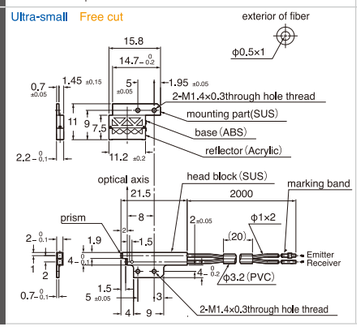
Wafer mapping

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

Reflector bundled



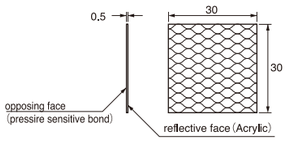
Specifications (Polarizing Filter Built in/Narrow Beam/Wafer Mapping)

	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

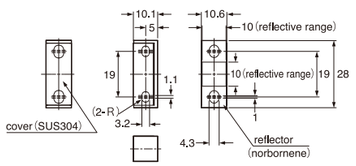
Operating humidity is 35~85%RH. Please use in 0~40℃ when it's 85%RH.

Reflector dimentions

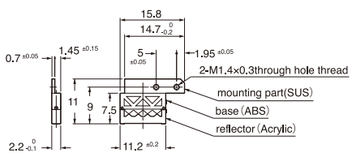
DG3030
(Standard accessory for NF-RR01)



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



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



SMALL FOCUSED BEAM

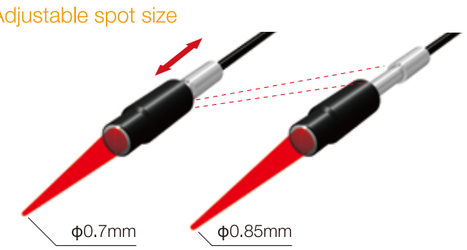
Very tiny focused spot beam for detecting small objects

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.

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.



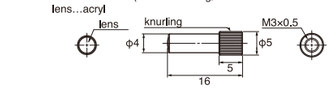
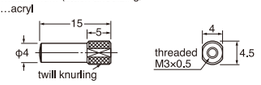
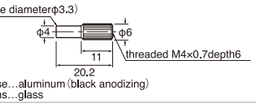
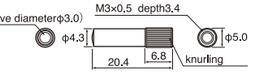
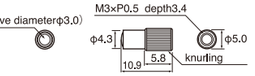
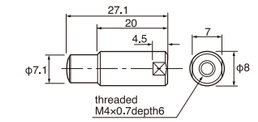
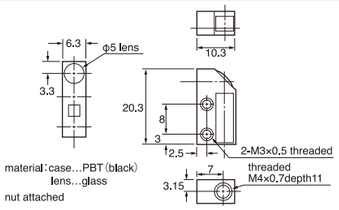
Detects small object by fine fiber core

0.125mm Dia. fiber core is built in NF-TP01 and NF-DP01 that enables detecting small object. The sleeve provides easy position adjustment.

NF-TP01 Thru-beam

NF-DP01 Diffuse

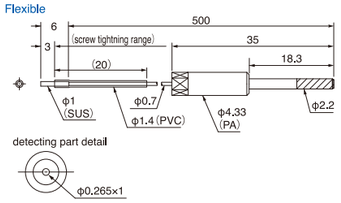
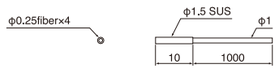
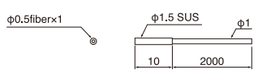
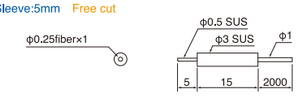
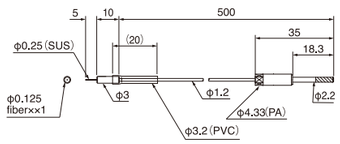
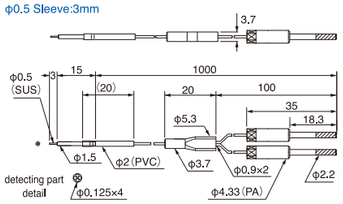
Specifications (Diffuse)

	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
	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
	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
	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℃ when it's 85%RH.

Thin and Tiny objects detected with diffuse fibers become easier to detect under higher sensitivity with longer response times or by boosting power of the 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℃ when it's 85%RH.

SCREEN BEAM ARRAY

NF-TS40 series

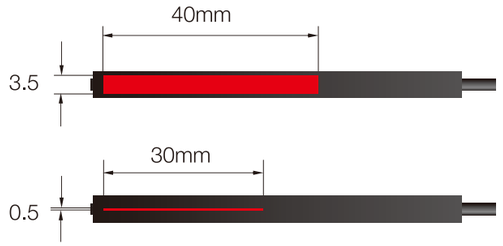
40 x 3.5mm Beam Array type with SUS (stainless steel) mounting metal.

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

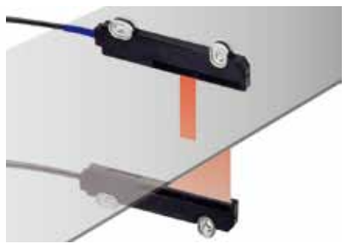


Fine sensing of 0.4mm diameter

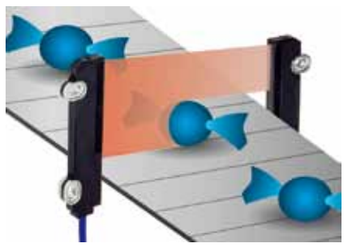
The Clear optical system of the NF-TS40 ensures 0.4mm diameter detection at a 3500mm sensing distance (with D3RF amplifier)

Applications

Control of dropping pills

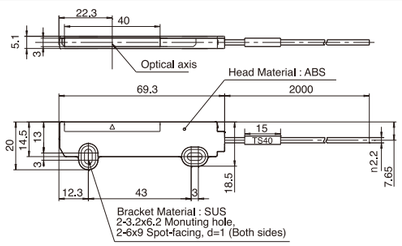


Control of meandering sheet



Counting on a conveyor

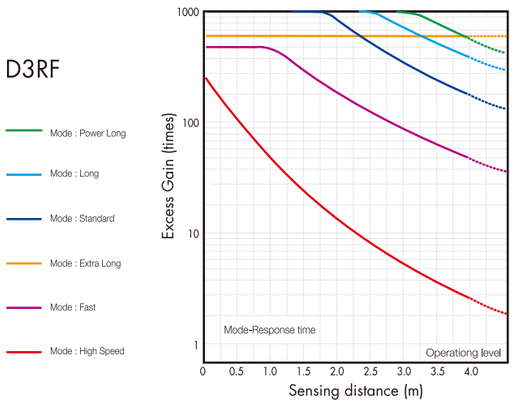
Specifications (Thru-beam/Diffuse)

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 3,000	3,600	−40~70	R=2	NF-TS40

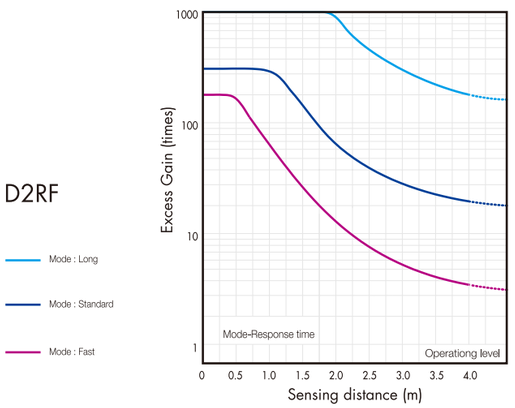
Model	NF-TS40
Sensing Range (D3RF amplifier)	0 - 3500mm
Spot Size	W40 × H3.5 @ 0mm
Bending Radius	R2
Fiber Lengfth	2000mm Free cut
Ambient Temp	−40~+60℃
Storage Temp	−40~+70℃
Demensions (W × D × H)	69.3 × 20 × 5.1 mm
Material	Base , Cover : ABS Fiber : PMMA
Torque	3kgfcm max.
Weight	30g

Excess Gain Curves (Typical Value)

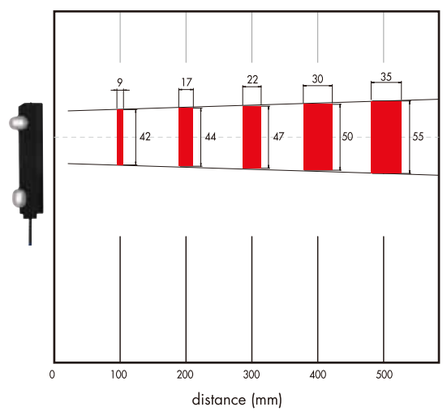
D3RF



D2RF



Spot size

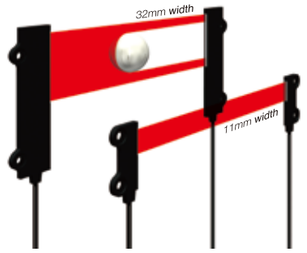


Screen array

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 masks can be used to shorten detection distance and for very small object detection.

The screen array beam is very collimated which helps prevent cross talk between sensors.

Beam array

Beam array fibers that have core fibers aligned are also available.

Thru-beam type

NF-TZ05 Head ON

NF-TZ06 Side ON

Diffuse type

NF-DZ02 Head ON

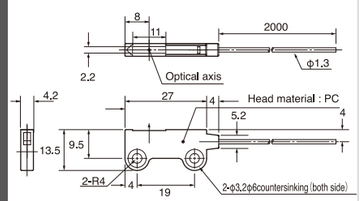
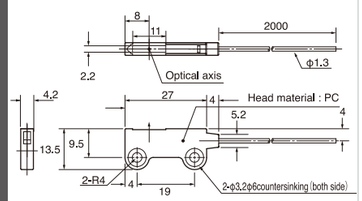
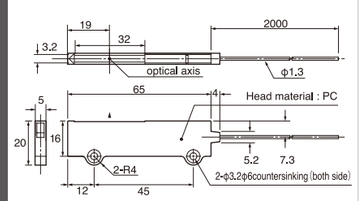
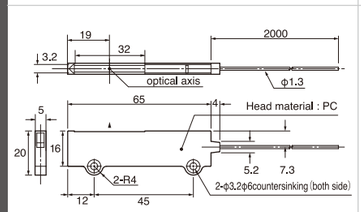
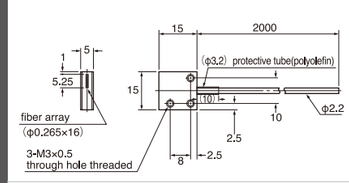
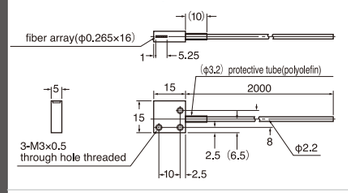
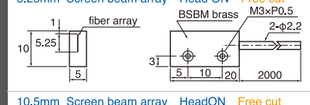
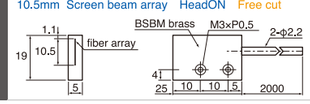
NF-DZ03 Side ON

NF-TS10 Head ON

NF-TS14 Head ON

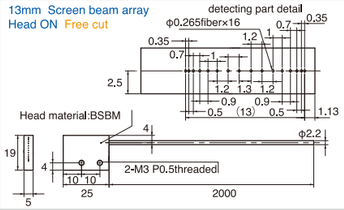
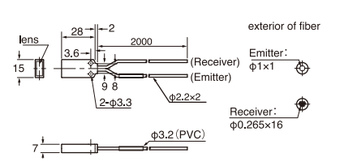
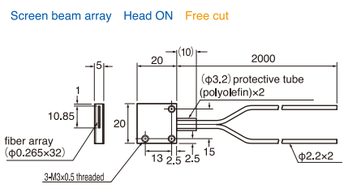
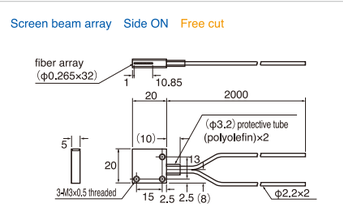
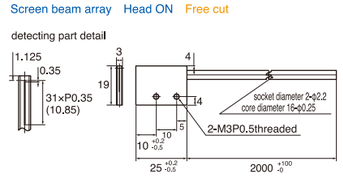
FD-ML02

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		7-EL 3,700 6-UL 3,000 5-PL 3,000 4-LG 2,200 3-ST 2,500 2-FS 2,000 1-HS 1,500	Long 3,500 Std 2,500 Fast 1,800	2,500	−40～70	R=2	NF-TZ10
		7-EL 3,700 6-UL 3,000 5-PL 3,000 4-LG 3,000 3-ST 2,500 2-FS 2,000 1-HS 1,000	Long 3,000 Std 2,500 Fast 1,200	2,000	−40～55	R=1	NF-TZ09
		7-EL 3,700 6-UL 3,700 5-PL 3,700 4-LG 3,700 3-ST 3,700 2-FS 3,000 1-HS 2,500	Long 3,700 Std 3,000 Fast 2,500	2,500	−40～60	R=2	NF-TZ08
		7-EL 3,700 6-UL 3,700 5-PL 3,700 4-LG 3,700 3-ST 3,700 2-FS 3,000 1-HS 2,500	Long 3,700 Std 3,000 Fast 2,500	2,500	−40～55	R=1	NF-TZ07
	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°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°C when it's 85%RH.
Sensing distance of diffuse type is for 500 x 500mm white paper.

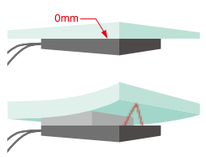
LIMITED DIFFUSE

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.

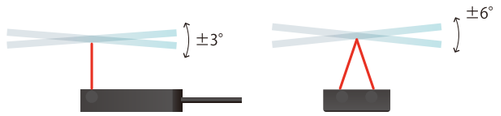
From "0mm" distance (NF-DC39)

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

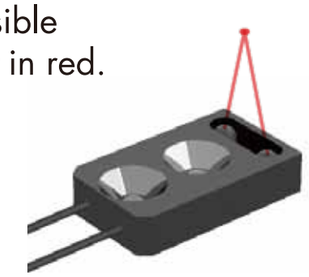


Not Affected by change in angle

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

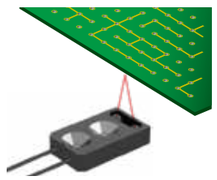


Clearly visible circle spot in red.

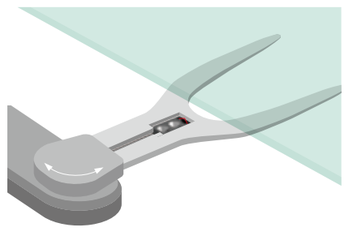


4mm wide spot (NF-DC39)

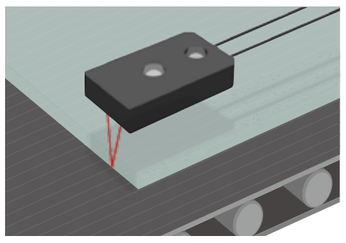
NF-DC39 has 4mm size spot that is applicable to PCB/PWB with holes.



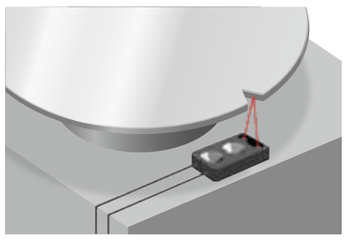
Applications



Edge Detection of Quartz Sheet



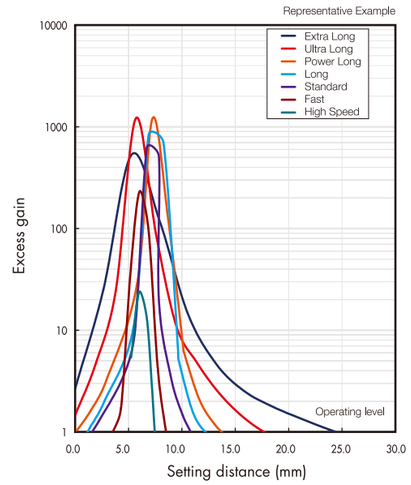
Edge Alignment on conveyor



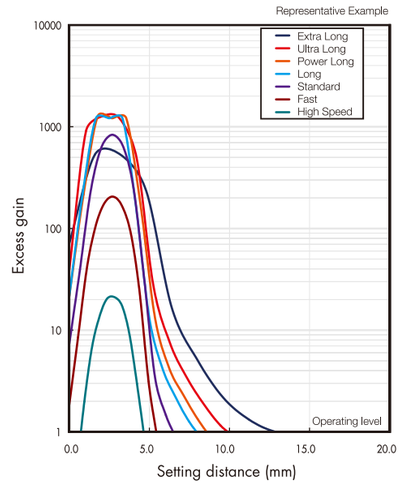
Notch Detection

Excess Gain Curves (Typical Value)

NF-DC38

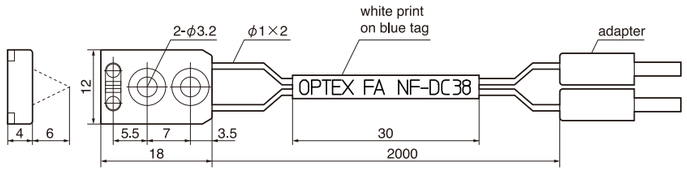


NF-DC39

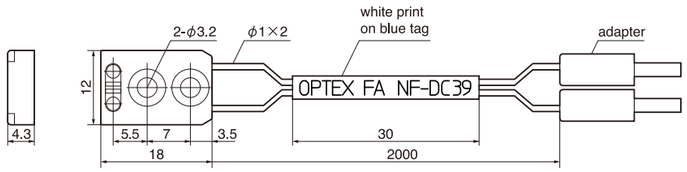


Dimensions (mm)

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	

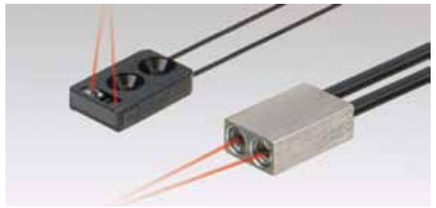
Sensing distance

NF-DC38

Value in parenthesis is the Minimum detectable object size. (copper wire)			Operation temperature (℃～℃)	Radius (mm)
D3RF		D2RF	BRF	
7-EL 0～12	3-ST 2.5～8	Long 2～9	3.5～7	−40～60	R=10
6-UL 0.5～11	2-FS 3.5～7.5	Std 4～8			
5-PL 1.5～10	1-HS 4.5～6	Fast 5～6			
4-LG 1.5～10					

NF-DC39

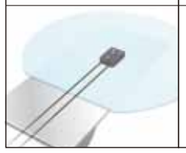
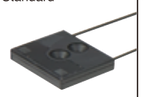
Value in parenthesis is the Minimum detectable object size. (copper wire)			Operation temperature (℃～℃)	Radius (mm)
D3RF		D2RF	BRF	
7-EL 1.5～4	3-ST 0～4	Long 0～4	0～4	−40～60	R=10
6-UL 0～4	2-FS 0～4	Std 0～4			
5-PL 0～4	1-HS 0～4	Fast 0～4			
4-LG 0～4					

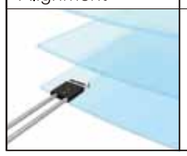


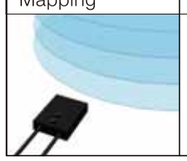
Convergent Beam enables detection of an object at a well defined sensing area.

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.

Presence	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  for warp / slant of glass	Flexible  for warp / slant of glass	Flexible  longer distance	Heat resistant 250°C  for warp / slant of glass	Heat resistant 300°C  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)

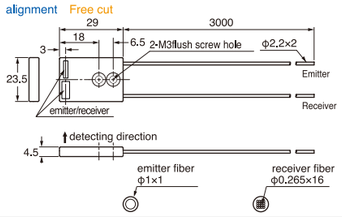
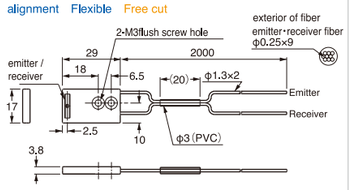
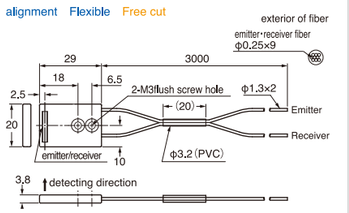
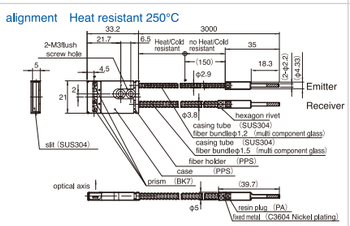
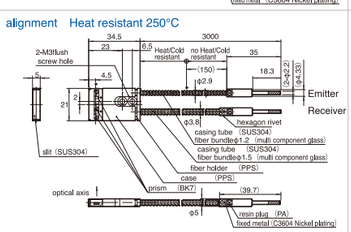
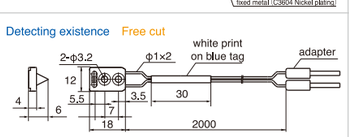
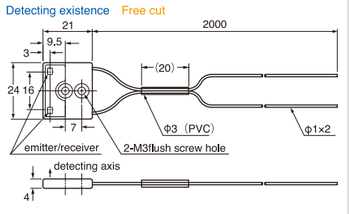

NF-DC39 (flat ON)


Detecting Cap side


Detecting FOUP

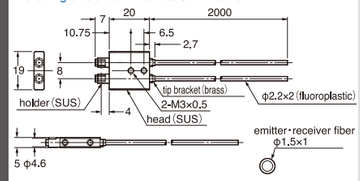
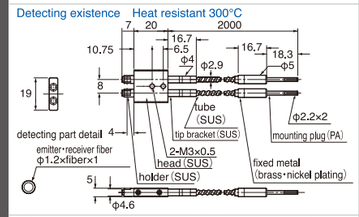
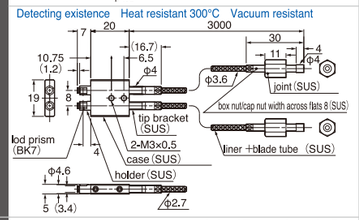
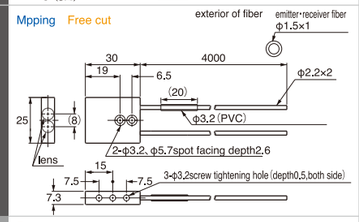
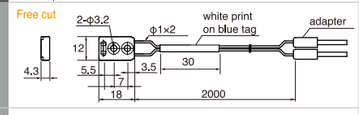
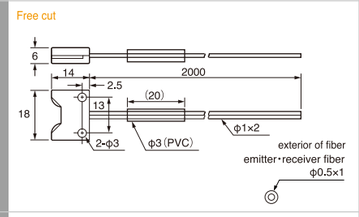
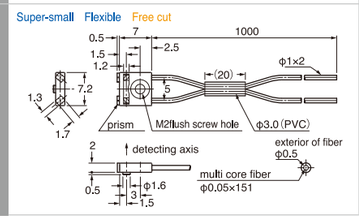

Detecting wafer notch


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

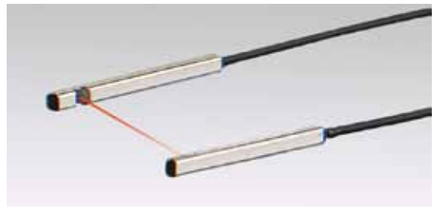
Operating humidity is 35~85%RH. Please use in 0~40℃ when it's 85%RH.

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℃ when it's 85%RH.
Sensing distance of diffuse type is for 500 x 500mm white paper.

NARROW BEAM , WAFER MAPPING

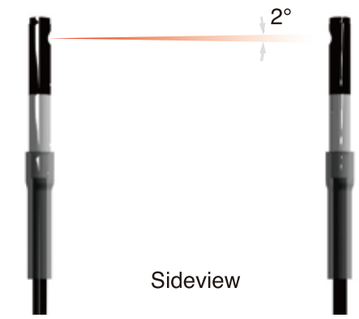


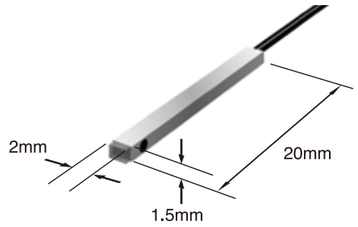
Ultra-narrow aperture light angle provides narrowest beam in a ultra-thin and ultra-compact size. Cross talk is reduced.

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-TG04 features ultra-compact size sensing head (2mm x 1.5mm) and ultra-narrow 3 degree aperture for minimum object detection of 0.02mm diameter.

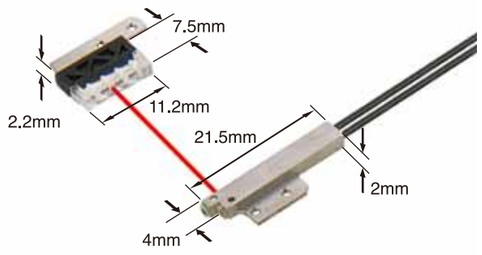




Retro-reflective and diffuse type

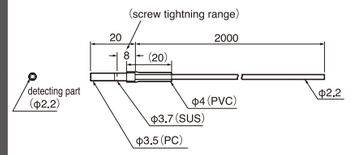
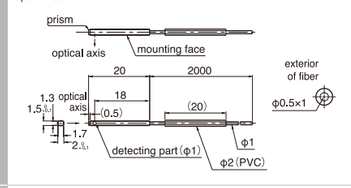
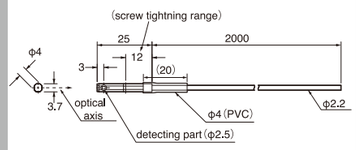
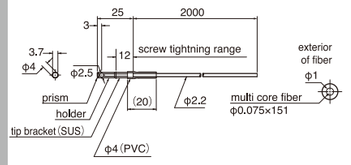
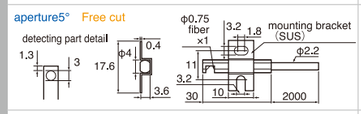
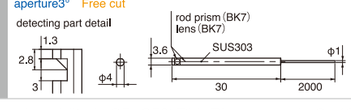
Super thin 2mm height Retro-reflective type enables wafer mapping saving space.

Retro-reflective type
NF-RG01



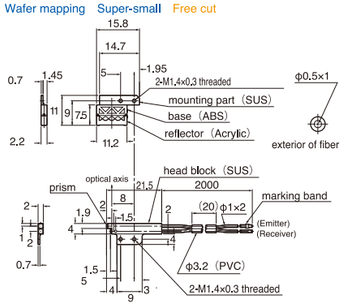
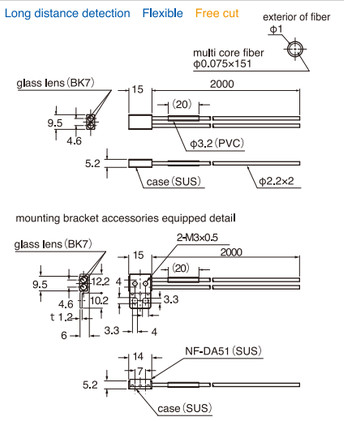
Diffuse type
NF-DR09

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

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

Specifications (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
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℃ when it's 85%RH.
Sensing distance of diffuse type is for 500 x 500mm white paper.

HEAT RESISTANT(up to130℃)

12 models to choose from featuring thrubeam and diffuse in both head-on and space saving side-view

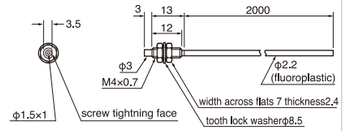
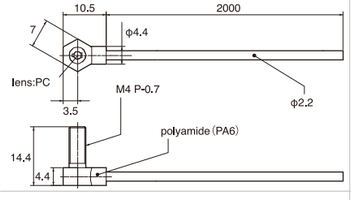
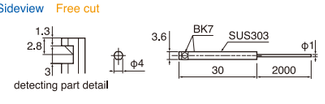
Space saving

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

Straight type

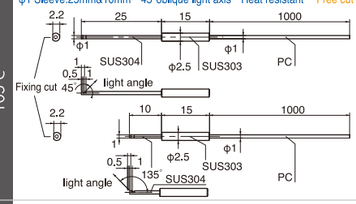
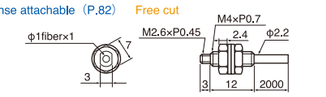
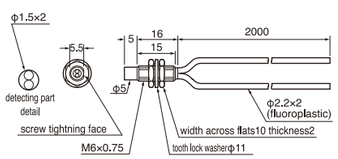
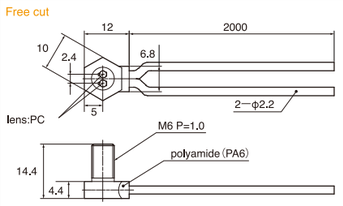
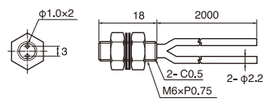
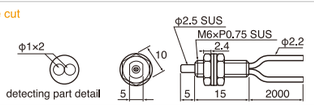
Right angle type

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

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

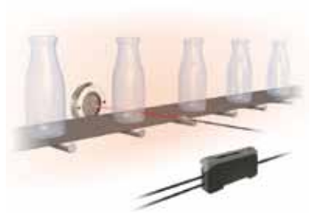
Specifications (Thru-beam/Diffuse)

		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℃	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
	100℃	lense attachable (P.82) 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	−40～100	R=25	NF-TH01
Diffuse	130℃	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	−60～130	R=25	NF-DH09
	105℃	Free cut 	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 	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 	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℃ when it's 85%RH.
Sensing distance of diffuse type is for 500 x 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℃)

14 models to choose from featuring thrubeam, diffuse and the new "joint type"

Various selection

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

Thru-beam (Standard)

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

Thru-beam (Joint type)

Head view			Sideview	
NF-TH12	NF-TH13	NF-TH14	NF-TH15	NF-TH16
Heat resistant 200℃	Heat resistant 200℃	Heat resistant 200℃	Heat resistant 200℃	Heat resistant 200℃
				
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℃	Heat resistant 180℃
	
Metal coated	Free cut

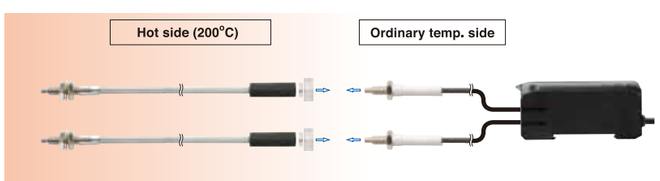
Limited Diffuse

Detect glass
NF-DH08
Heat resistant 180℃

Free cut

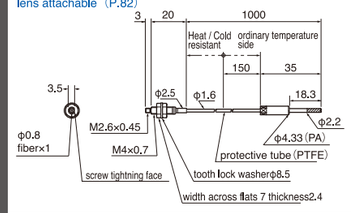
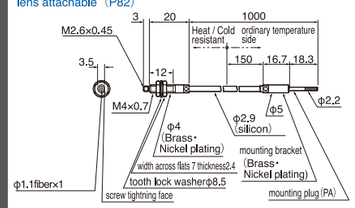
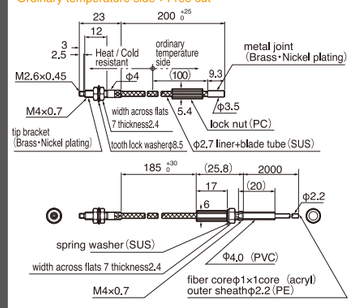
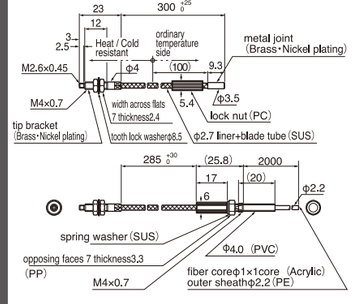
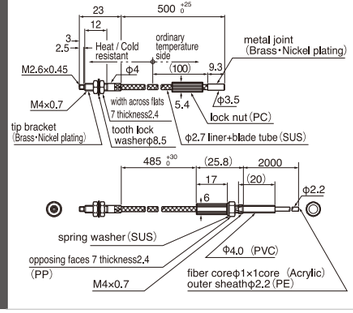
New concept : Joint type

Heat-resistant fiber section is coupled with a standard cuttable fiber cable providing cut-to-length fiber cable installation.



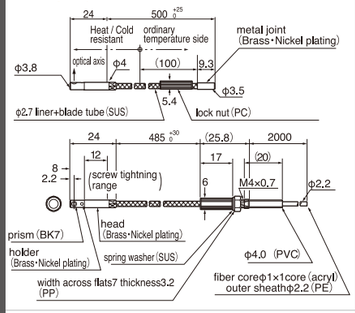
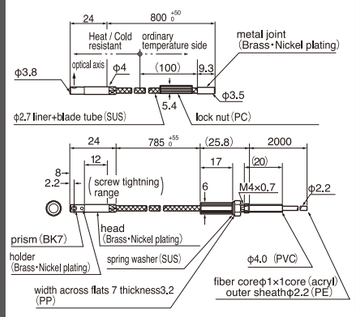
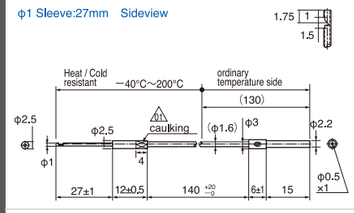
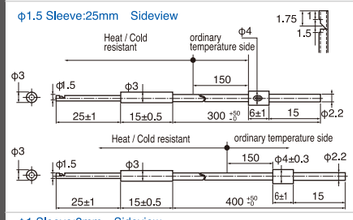
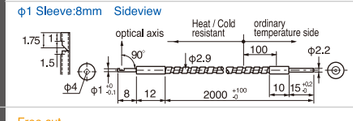
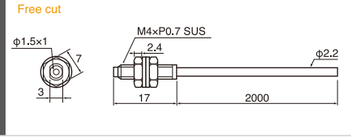
Also available with heat-resistant side only (minus the standard cuttable fiber)

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

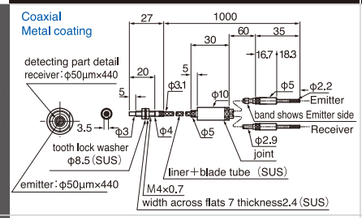
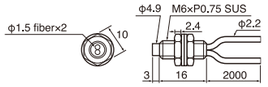
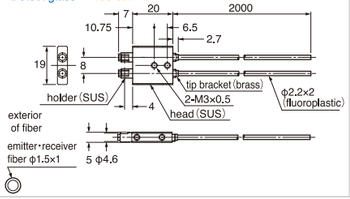
Operating humidity is 35~85%RH. Please use in 0~40℃ when it's 85%RH.

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
	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℃ 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℃ when it's 85%RH.
Sensing distance of diffuse type is for 500 x 500mm white paper.

HEAT RESISTANT(200℃~300℃)

Wide selection of rugged fiber cables for reliable detection in high temperature areas

Thru-beam, Diffuse, Limited diffuse type

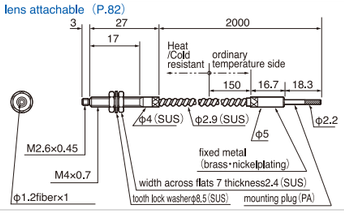
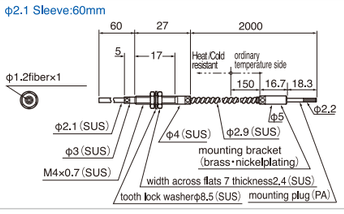
We have 3 thru-beam types, 3 diffuse types and 3 limited diffuse type.

Thru-beam

Diffuse

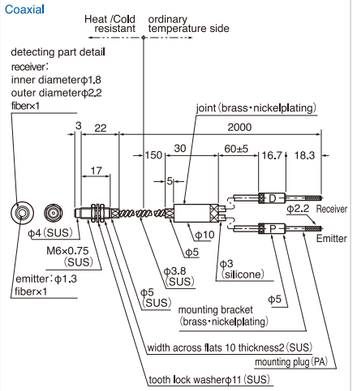
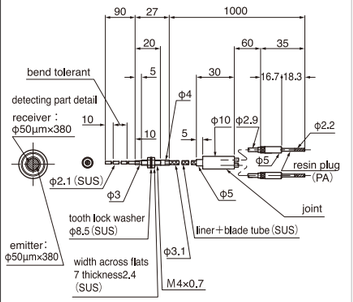
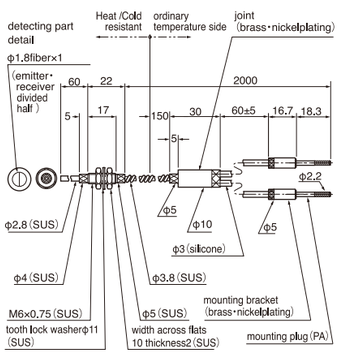
Limited diffuse

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

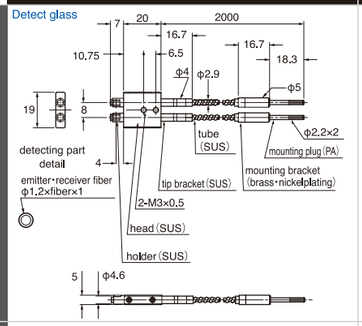
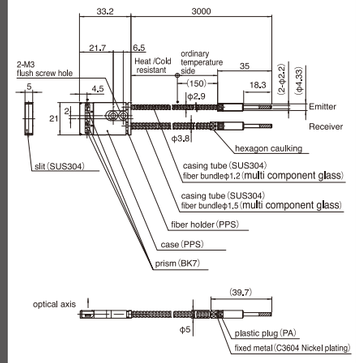
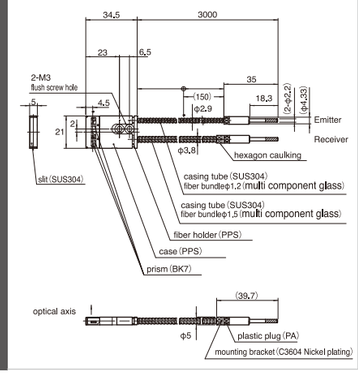
Operating humidity is 35~85%RH. Please use in 0~40℃ when it's 85%RH.

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℃ when it's 85%RH.
Sensing distance of diffuse type is for 500 x 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℃ when it's 85%RH.

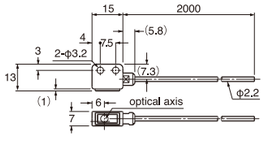
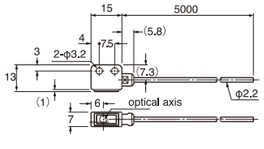
CHEMICAL RESISTANT

Fluoroplastic (PFA) sheath provides superior chemical resistance

High resistance to harsh chemicals

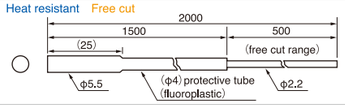
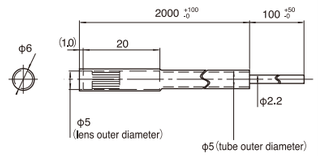
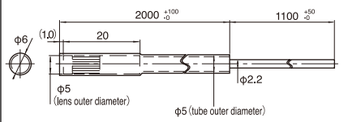
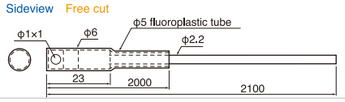
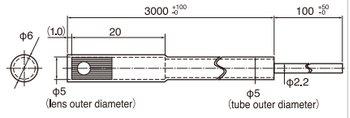
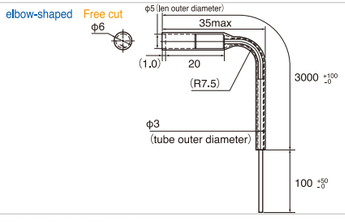
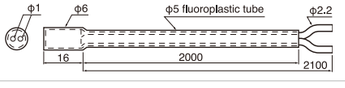
PFA encased fiber sensors are an excellent choice for reliable detection in harsh chemical, extreme temperature, and highly abrasive enviroments. Eight thrubeam and one diffuse models to choose from.

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℃ 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	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
		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℃ when it's 85%RH.

VACUUM RESISTANT

For use in vacuum environments in temperatures up to 300°C

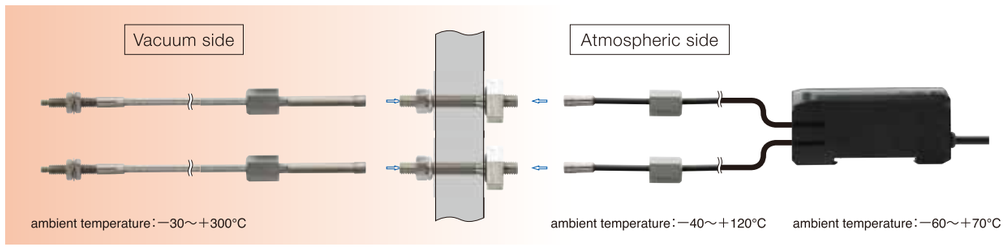
Thru-beam, Diffuse, Limited diffuse type

Choose from three types of vacuum resistant fibers.
Separate lens are for long distance detection and side view detecton.

Thru-beam
NF-TN01

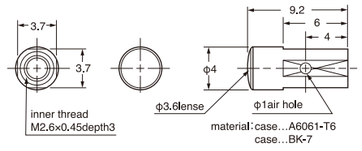
Diffuse
NF-DN01

Limited diffuse
NF-DN02



Lens for vacuum resistant fiber unit

Lens for long distant detection
NF-TA06

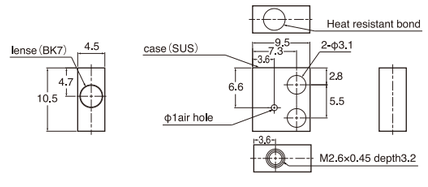


Sensing distance (unit=mm)

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)

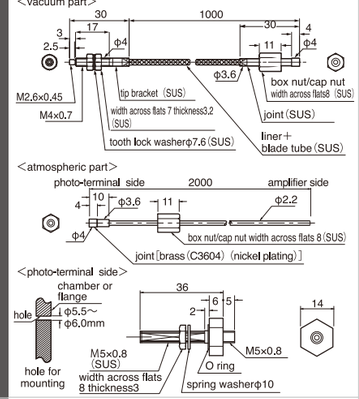
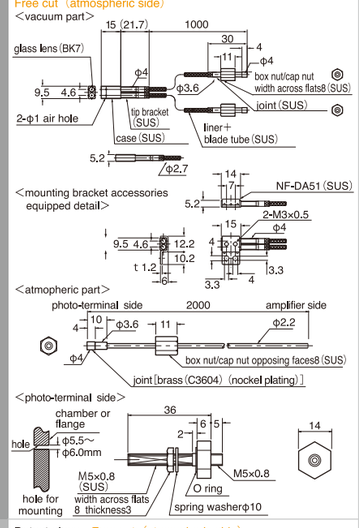
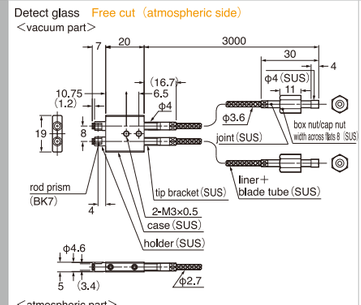


Sensing distance (unit=mm)

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>  	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>  	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>  	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℃ when it's 85%RH.
Sensing distance of diffuse type is for 500 x 500mm white paper.

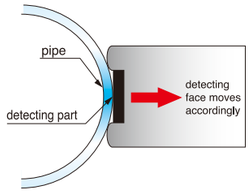
LIQUID LEVEL & LIQUID LEAK DETECTION

Choose from pipe-mountable or PFA protected contact type for level detecting and compact PFA encased for leak sensing.

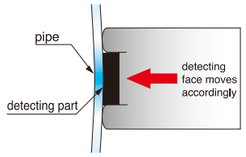
Liquid level: pipe mount type

Mounts to pipe diameters from 3mm to 80mm in diameter.
NF-DF07 extremely resistant to foam and bubbles.

8mm Dia.



80mm Dia.



Liquid level: contact type

Unique multistep tip design prevents accumulation of liquid at the tip of the sensor head.

3 types of joint are available;

NF-DA54 for Liquid inflow prevention type

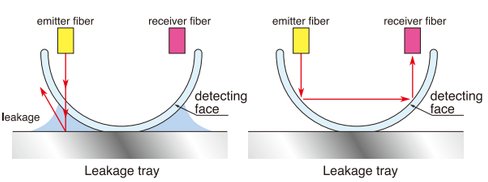
NF-DA55 for Protective tube mounting

NF-DA56 for fiber cable mounting

You can procure ferrule for joint above; NF-DA57

Leakage type

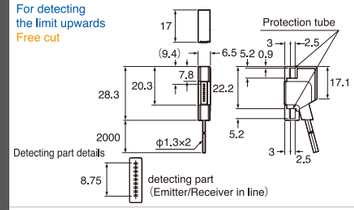
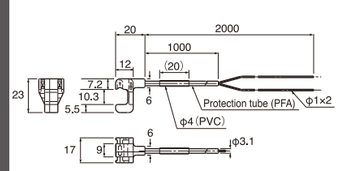
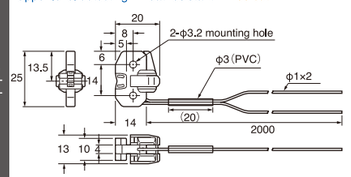
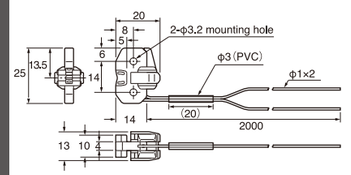
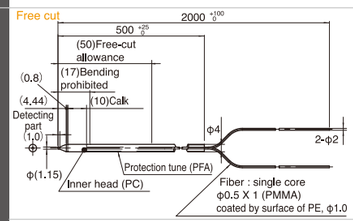
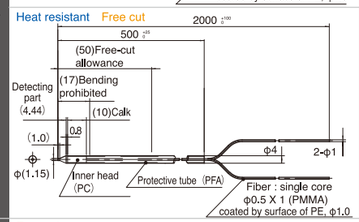
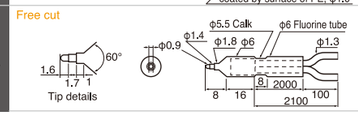
It detects liquid leakage on the surface of flat pan.



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

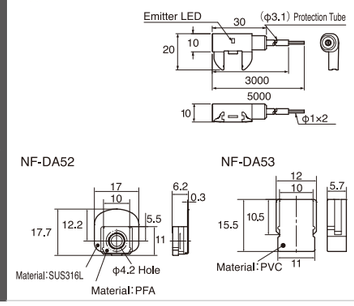
The light reflects at the detecting face and the light comes into receiver.

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-DF04
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
	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℃ when it's 85%RH.

Specifications (Leakage Detect)

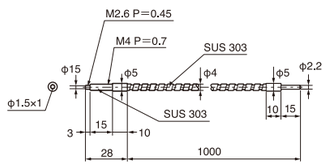
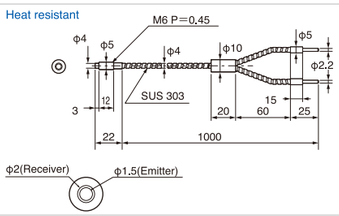
	Sensing head	Sensing conditions	Operation temperature (℃～℃)	Radius (mm)	Part Number
Leakage detect / Square	Free cut 	Corresponds to SEMI S2 Requires fixture for installation; NF-DA52 (SUS) NF-DA53 (PVC)	−20～50	protective tube R=20 fiber R=4	NF-DW02

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

Detection of water

Fiber cables for use with Optex IR type amplifers for reliable detection of water in clear containers

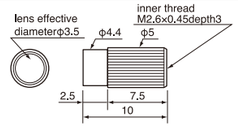
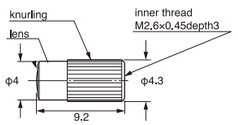
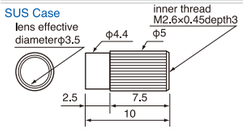
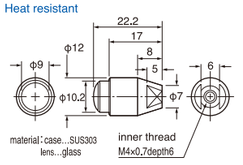
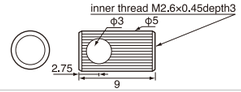
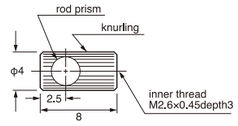
Specifications (Thru-beam/Diffuse)

		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

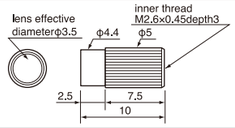
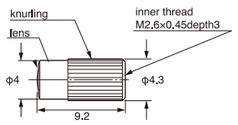
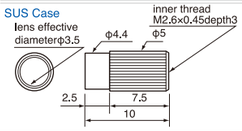
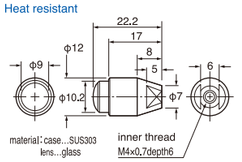
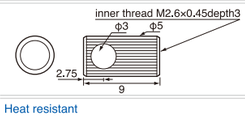
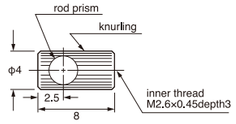
Operating humidity is 35~85%RH. Please use in 0~40℃ when it's 85%RH
Sensing distance of diffuse type is for 500 x 500mm white paper.

LENS FOR THRU-BEAM FIBERS

Straight and 90 degree add-on lenses for increasing sensing distances

	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	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	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	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	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	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	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℃ 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	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	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	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	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	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	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°C when it's 85%RH

WARNINGS

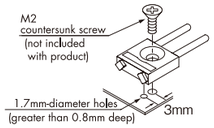
Please use this product correctly.
Do Not use this product for personnel protection.

Mounting

Mounting Fibers With Positioning Bosses

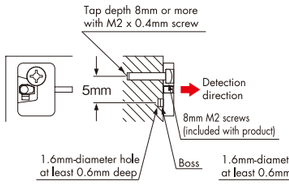
NF-DC08

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.

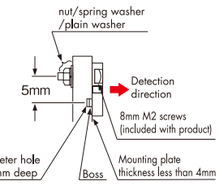


NF-TE01/NF-DE01 (Flat-On Type)

When screwing a tap into the attachment



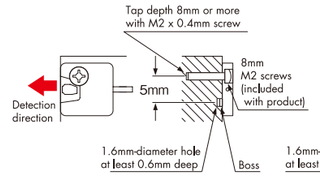
When using the attached screws and nuts



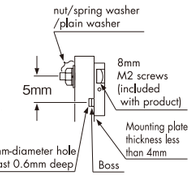
(Note 1): The NF-TE01 is pictured above. NF-DE01 is mounted in the same way.
(Note 2): Through beam fibers have the same dimensions. Be aware of the positions of the screw holes and boss holes when mounting fibers.

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

When screwing a tap into the attachment

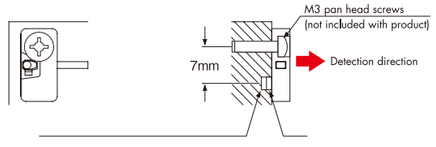


When using the attached screws and nuts



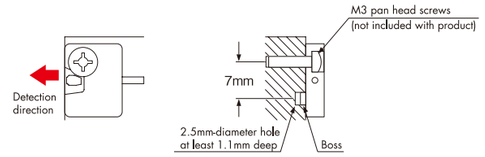
(Note 1): The NF-TE02 is pictured above. NF-DE02 is mounted in the same way.
(Note 2): Through beam fibers have the same dimensions. Be aware of the positions of the screw holes and boss holes when mounting fibers.

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)

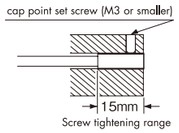


(Note 1): The NF-TE04 is pictured above. NF-DE04 is mounted in the same way.
(Note 2): Through beam fibers have the same dimensions. Be aware of the positions of the screw holes and boss holes when mounting fibers.

Mounting NF-DR09/ -RR01

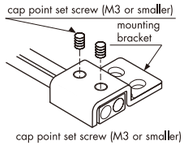
When not using mounting bracket NF-DA51 (included with this product)

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



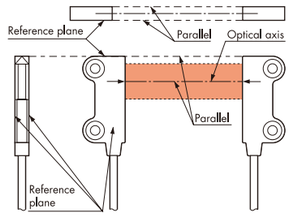
When using mounting bracket NF-DA51 (included with this product)

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-TZ07/-TZ08/-TZ09/-TZ10)

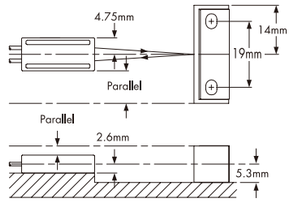
Please take care when mounting this product because its aperture angle is extremely small, and there are cases where the fibers do not transmit light because of the way they were mounted.
As shown in the diagram below, determine a reference plane, make sure the optical axis is aligned properly, and mount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



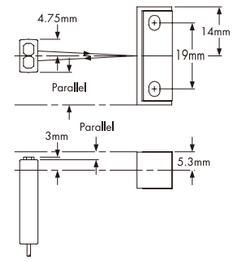
Mounting NF-RB01/-RB02

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

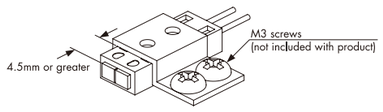


Side-On Type/NF-RB02



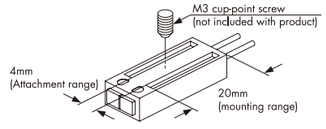
When mounting fiber bracket

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.

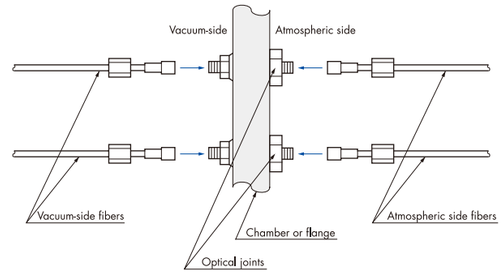


A Note About NF-RB01/-RB02

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

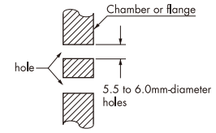


Leak: 1.33x10-10Pa•m3/s [He] or lower

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.

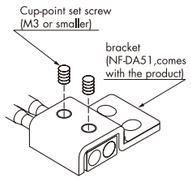
(Note 1): Tighten the nut well.
If the nut is loose, there may be a gap, and the detection distance will drop.

⑤ Mount the tip of the vacuum-side fiber.

For NF-DN01

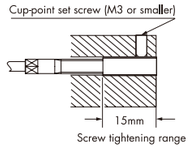
When using bracket

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.



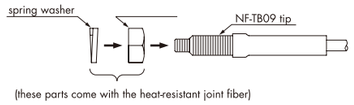
Mounting Heat-Resistant Joint Fibers (NF-TH12/-TH13/-TH14/-TH15/-TH16)

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

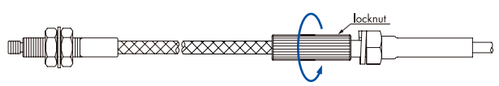
To connect heat-resistant joint fibers to NF-TB09, follow the instructions below.

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.

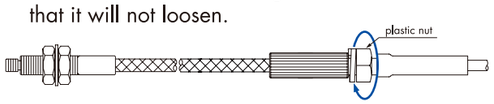


② Attach the heat-resistant joint fiber to the NB-TB09 with a locknut.



(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.

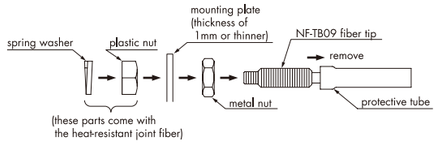
Instructions

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.

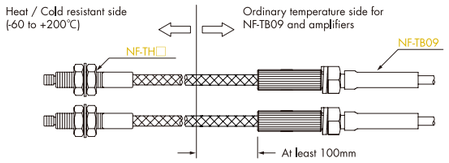
③ Follow the instructions from <Connecting heat-resistant joint fibers to NF-TB09> to connect the heat-resistant joint fiber to NF-TB09.

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.



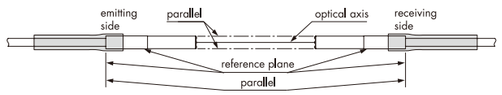
Mounting Narrow Beam/Wafer Mapping Fibers (NF-TG01/-TG02/-TG03/-TG04)

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.

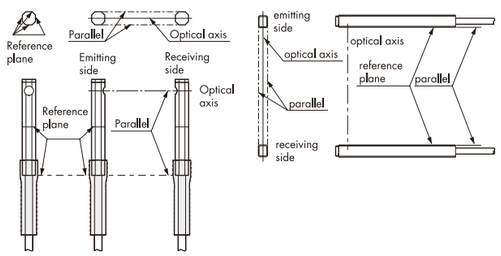
Through beam Type

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

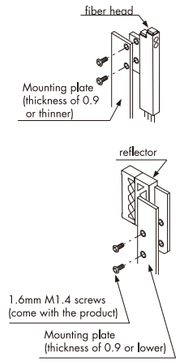


NF-TG02/-TG03/-TG04

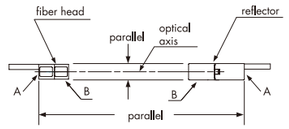


Reflective Type

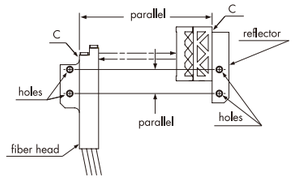
Use 1.6mm M1.4 screws to mount the fiber head and reflector to the mounting plate as shown in the diagram on the right. The mounting plate needs to have a thickness of 0.9mm or thinner.
Use a thread lock compound to tighten screws when mounting them in places with vibrations or shocks.
Attach the parts 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

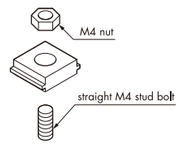


Side View

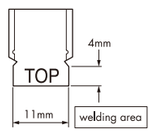


Mounting Leak Detection Fibers (NF-DW02)

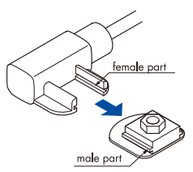
If you are using an SUS bracket, thread a welded M4 stud bolt through the hole on the bracket and attach an M4 nut (not included with this product).



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.

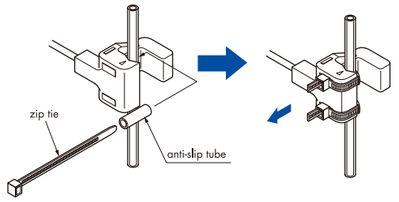


Slide the male part of the bracket attached to the steel case into the female part on the fiber until you hear them click.

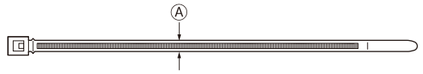


Mounting Pipe-Mounted Fluid Level Detection Fibers (NF-TF01)

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.

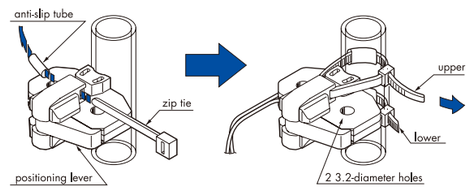


We recommend using zip ties of a thickness 2.5mm or smaller as shown in the diagram below.

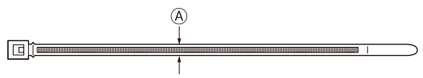


Mounting Pipe-Mounted Fluid Level Detection Fibers (NF-DF04/-DF05)

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.



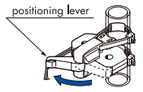
You must use M3 screws, plain washers and spring washers when using the holes for mounting.
(These parts are not included with this product)

Positioning Pipe-Mounted Fluid Level Detection Fibers

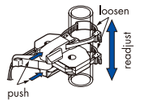
You can easily readjust the attachment position when using zip ties to mount this product.

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.

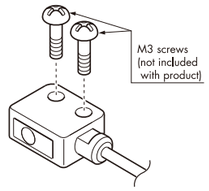


③ Close the positioning lever so that it will not loosen.

(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.

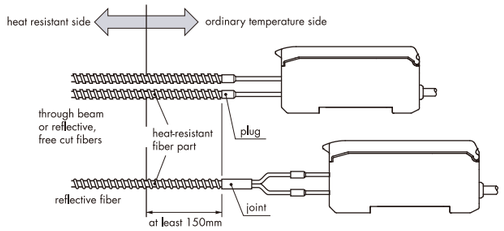
Mounting Chemical-Resistant Angled-Head Fibers (NF-TY05)

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.



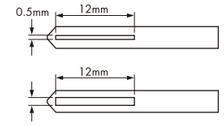
Do not directly expose amplifiers to radiation heat or hot air.
The metal bracket on the tip of the heat-resistant fiber (up to 350℃) and stainless steel sheath may change color when used at high temperatures, but this does not affect their detection capability.

Notes about Adhesive Slits Included With NF-TZ07/-TZ08 /-TZ09/-TZ10

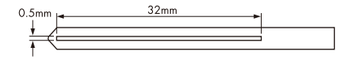
There are two types of slits that come with these products (the slit that comes with the NF-TZ07/ -TZ08 is one of them). These slits help detecting tiny objects and prevent saturation when using the fibers at close range. However, applying adhesive slits shortens the detection distance.
Align the pointed 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)

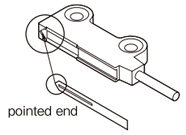
NF-TZ09/-TZ10



NF-TZ07/-TZ08



How to Apply Adhesive Slits

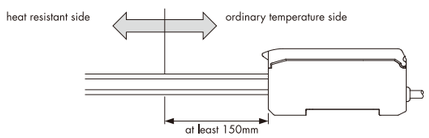


Notes about NF-TY01(-□) /-TY02(-□)/-TY03-TF03/-TY04 /-TY05(-□)/-DY01(-□)

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)

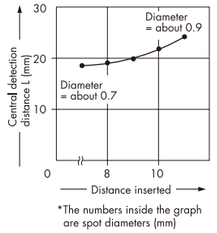
Keep the heat-resistant fiber part at least 150mm from the boundary of the ordinary-temperature zone as shown below in order to protect amplifiers.

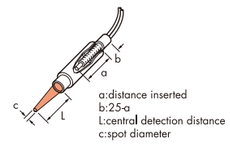


Do not directly expose amplifiers to radiation heat or hot air.

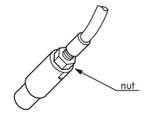
Notes about NF-DA06

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.

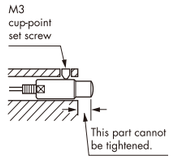




Tighten the fiber nut after setting the fiber and NF-DA06 in place in order to fix them so that they do not move because of vibrations, etc.

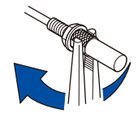


Use M3 cup-point set screws to mount NF-DA06 if you want to use set screws.



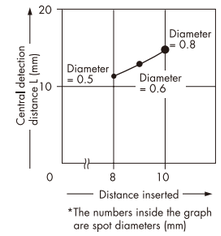
Notes about NF-DA01/-DA02 /-DA03/-DA04/-DA05

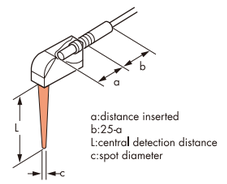
Insert fibers into NF-DA01/ -DA02/ -DA03/ -DA04/ -DA05 as far as they will go.



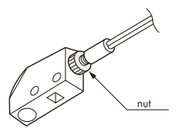
Notes about NF-DA07

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 to insure proper mounting and reliable detection. If you ue a PVC bracket on a black mat background the sensing could become unreliable because of poor reflection.

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.

Be sure that the mounting of the NF-TF01/ -DF04/ DF05 is tight. A loose mounting can cause unreliable detection.
Be sure to use the anti-slip tube that comes with the product when attaching to the pipe and tighten securely.

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.

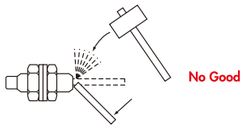
NF-DF04/ -DF05 is not water- or chemical-resistant. Do not use it in places where it may come into direct contact with water or chemicals.

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.

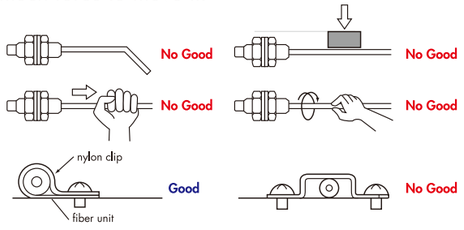
General Precautions

Precautions for Fiber Units

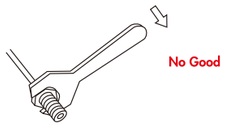
1. Do not hit the detection head surface against anything or damage it in any other way.



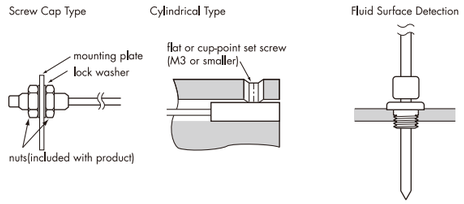
2. Do not bend or twist the fiber head or use too much force to move it.



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.

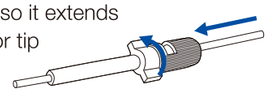


5. Cut the tips of cuttable fiber units with special fiber cutters before attaching fiber amplifier when needed.

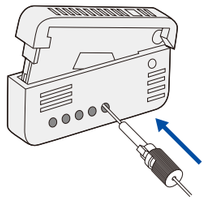
Precautions for Fiber Cutters

1. Cutting Instructions

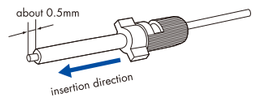
① Insert the fiber cable so it extends beyond the connector tip as shown. Twist the back knurled cap until the cap locks into place.



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

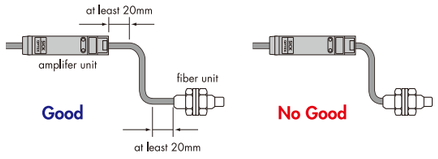


③ The diagram on the right shows a properly-cut fiber.



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

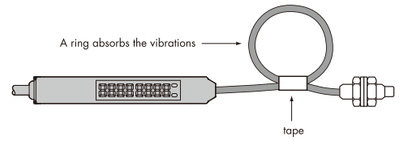
3. Leave some straight line near the insertion part and the tip of the fiber unit.



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.

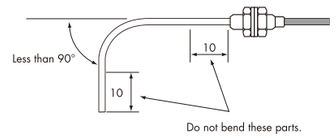
5. In places with a lot of vibrations, mount the fiber unit so that it does not vibrate. Pay special attention that the vibrations do not reach the connection between the fibers and amplifier.

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.



DISPLACEMENT SENSOR

Displacement sensors must be easy to operate, compact in size
and have high accuracy.
Optex-FA offers the CD22 and the CD33 series of laser displacement sensors
for OEM use that may demand compact dimensions.
CD5 series Specular Type provides 0.02 µm resolution
as well as +/- 0.08% linearity.

DISPLACEMENT SENSOR

CD SERIES LINE UP

CD5 series

Sensor head

Model	Type	Light source	Measuring range (mm)	Linearity	Resolution
CD5-L25	Specular Narrow	IEC Class 2 FDA CLASS II	25±1	±0.08% F.S.	0.02μm
CD5-LW25	Specular Wide				
CD5-30	Narrow Specular mode		26.1±2.5	±0.08% F.S.	0.1μm
CD5-W30	Wide Specular mode				
CD5-30	Narrow		30±5	±0.08% F.S.	0.2μm
CD5-W30	Wide				
CD5-85	Narrow Specular mode		82.3±10	±0.08% F.S.	0.5μm
CD5-W85	Wide Specular mode				
CD5-85	Narrow		85±20	±0.05% F.S.	1μm
CD5-W85	Wide				
CD5-150	Narrow		150±50	±0.05% F.S.	2μm
CD5-W150	Wide				
CD5-W350	Wide		350±100	±0.08% F.S.	5μm
CD5-W500	Wide		500±200	±0.08% F.S.	10μm
CD5-W2000	Wide	IEC Class 3R FDA CLASS IIIa	2000±500	±0.1% F.S.	30μm

Controller

Model	Number of connected sensor heads	Output	Sensor heads
CD5A-N	Max. 3pcs	±10V / F.S., 4-20mA / F.S. RS-232C, USB	CD5 series heads
CD5A-P			

When you trade the CD5-L25 and CD5-30 internationally, please confirm laws and regulations of the country that ratifies “Wassenaar Arrangement”.
We can provide a version of the displacement sensor that conforms to the “Wassenaar arrangement”. Please contact distributors in your country.

CD4 series

Sensor head

Model	Type	Light source	Measuring range (mm)	Linearity	Resolution
CD4-30	Regular	Class 2 (IEC/JIS), CLASS II (FDA)	30±5	±0.1% F.S.	1μm
CD4-30-3R	High power	Class 3R (IEC/JIS), CLASS IIIa (FDA)			
CD4-85	Regular	Class 2 (IEC/JIS), CLASS II (FDA)	85±20		3μm
CD4-85-3R	High power	Class 3R (IEC/JIS), CLASS IIIa (FDA)			
CD4-350	Regular	Class 2 (IEC/JIS), CLASS II (FDA)	350±100		40μm
CD4-350-3R	High power	Class 3R (IEC/JIS), CLASS IIIa (FDA)			

Model	Type	Light source	Measuring range	Linearity	Resolution
CD4L-25	Specular	Class 1 (IEC/JIS) CLASS II (FDA) Laser, 650nm, Max 390 Micro W	25±1	±0.1% F.S.	0.1μm

Controller

Model	Number of connected sensor heads	Output	Sensor heads
CD4A-N	Max. 2pcs	±5V / F.S., 4-20mA / F.S. RS-232C	CD4 series heads
CD4A-P			
CD4A-LN			CD4L-25 series heads
CD4A-LP			

CD33 series

Diffuse type

Model	Type	Light source	Measuring range (mm)	Linearity	Resolution Fast	Resolution Other
CD33-30□□	Cable	IEC Class 2 FDA CLASS II	30±4	±0.1% F.S.	4μm	2μm
CD33-30C□□	Connector					
CD33-50□□	Cable		50±10		8μm	5μm
CD33-50C□□	Connector					
CD33-85□□	Cable		85±20		15μm	10μm
CD33-85C□□	Connector					
CD33-120□□	Cable		120±60		45μm	30μm
CD33-120C□□	Connector					
CD33-250□□	Cable		250±150		75μm	100μm
CD33-250C□□	Connector					

※ Product code : CD33-■■NV (N=NPN, V=Voltage Output 0-10V), CD33-■■PV (P=PNP, V=Voltage Output 0-10V),
CD33-■■CNV (N=NPN, V=Voltage Output 0-10V), CD33-■■CPV (P=PNP, V=Voltage Output 0-10V),
CD33-■■NA (N=NPN, A=Current Output 4-20mA), CD33-■■PA (P=PNP, A=Current Output 4-20mA)
CD33-■■CNA (N=NPN, A=Current Output 4-20mA), CD33-■■CPA (P=PNP, A=Current Output 4-20mA)
CD33-■■N-422 (N=NPN, 422=RS422 Ⅰ / F), CD33-■■P_422 (P=PNP, 422=RS422 Ⅰ / F)
CD33-■■CN-422 (N=NPN, 422=RS422 Ⅰ / F), CD33-■■CP_422 (P=PNP, 422=RS422 Ⅰ / F)

Specular type

Model	Type	Light source	Measuring range (mm)	Linearity	Resolution
CD33-L30□□	Cable	IEC Class 1 FDA CLASS II	26.3±2	±0.2% F.S.	1μm
CD33-L30C□□	Connector				
CD33-L50□□	Cable		47.3±5	±0.2% F.S.	2.5μm
CD33-L50C□□	Connector				
CD33-L85□□	Cable		82.9±10	±0.2% F.S.	5μm
CD33-L85C□□	Connector				

※ Product code : CD33-L■■NV (N=NPN, V=Voltage Output 0-10V), CD33-L■■PV (P=PNP, V=Voltage Output 0-10V),
CD33-L■■CNV (N=NPN, V=Voltage Output 0-10V), CD33-L■■CPV (P=PNP, V=Voltage Output 0-10V),
CD33-L■■NA (N=NPN, A=Current Output 4-20mA), CD33-L■■PA (P=PNP, A=Current Output 4-20mA)
CD33-L■■CNA (N=NPN, A=Current Output 4-20mA), CD33-L■■CPA (P=PNP, A=Current Output 4-20mA)
CD33-L■■N-422 (N=NPN, 422=RS422 Ⅰ / F), CD33-L■■P-422 (P=PNP, 422=RS422 Ⅰ / F)
CD33-L■■CN-422 (N=NPN, 422=RS422 Ⅰ / F), CD33-L■■CP-422 (P=PNP, 422=RS422 Ⅰ / F)

CD3 series

Model	Type	Light source	Measuring range (mm)	Linearity	Resolution ※1
CD3-30□	Cable	Class 2 Laser, 650nm, Max 1mW	30±4	±1% F.S.	4μm
CD3-30C□	Connector				
CD3-50□	Cable		50±10	±1% F.S.	10μm
CD3-50C□	Connector				
CD3-80□	Cable		80±15	±1% F.S.	10μm
CD3-80C□	Connector				
CD3-100□	Cable		100±40	±1% F.S.	30μm
CD3-100C□	Connector				
CD3-250□	Cable		250±150	±1.5% F.S. (up to 250mm) ±2.5% F.S. (up to 400mm)	150μm
CD3-250C□	Connector				

※ Product code : CD3-■■N (N=NPN), CD3-■■CN (N=NPN), CD3-■■P (P=PNP), CD3-■■CP (P=PNP)
※1. Unit : Micron. Under AUTO sensitivity. White ceramic as an object

FASTUS

CD22 series

Model	Type	Light source	Measuring range (mm)	Linearity	Resolution ※1
CD22-15A□	Cable	Suffix none : CLASS 1 Suffix 2 : CLASS 2	10 15 20 — 15±5	±1% F.S.	1μm
CD22-15V□	Connector				
CD22-15-485□	Cable				
CD22-35A□	Connector		20 35 50 — 35±15		6μm
CD22-35V□	Cable				
CD22-35-485□	Connector				
CD22-100A□	Cable		50 100 150 — 100±50		20μm
CD22-100V□	Connector				
CD22-100-485□	Cable				

※ Product code : CD22-■■ (Aluminium Housing), CD22M-■■ (SUS Housing)
CD22-■■AM12 (A=Current 4-20mA, M12=Connector M12), CD22-■■AM8 (A=Current 4-20mA, M8=Connector M8),
CD22-■■AM122 (A=Current 4-20mA, M12=Connector M12, 2=class 2), CD22-■■AM82 (A=Current 4-20mA, M8=Connector M8, 2=class 2),
CD22-■■VM12 (AV=Voltsge 0-10V, M12=Connector M12), CD22-■■VM8 (V=Voltsge 0-10V, M8=Connector M8),
CD22-■■VM122 (V=Voltsge 0-10V, M12=Connector M12, 2=class 2), CD22-■■VM82 (V=Voltsge 0-10V, M8=Connector M8, 2=class 2),
CD22-■■-485M12 (-485=RS-485, M12=Connector M12), CD22-■■-485AM8 (-485=RS-485, M8=Connector M8),
CD22-■■-485AM122 (485=RS-485, M12=Connector M12, 2=class 2), CD22-■■-485AM82 (-485=RS-485, M8=Connector M8, 2=class 2),
※1. Unit : Micron. Under AUTO sensitivity. White ceramic as an object

CD1 series

Model	Type	Light source	Measuring range (mm)	Linearity	Resolution ※1		
					100ms	10ms	1ms
CD1-30□	Cable	Class 2 Laser, 650nm, Max 3.3mW	26 30 34 — 30±4	±2% F.S.	1	3	10
CD1-30C□	Connector						
CD1-50□	Cable		40 50 60 — 50±10	±1% F.S.	3	10	30
CD1-50C□	Connector						
CD1-100□	Cable		65 100 135 — 100±35	±2% F.S.	15	50	150
CD1-100C□	Connector						
CD1-130□	Cable		80 130 180 — 130±50	±3.5% F.S.	20	70	200
CD1-130C□	Connector						
CD1-250□	Cable		100 250 400 — 250±150	±5% F.S.	150	500	1500
CD1-250C□	Connector						

※ Product code : CD1-■■N (N=NPN), CD1-■■CN (N=NPN), CD1-■■P (P=PNP), CD1-■■CP (P=PNP)
※1. Unit : Micron. Under AUTO sensitivity. White ceramic as an object

LS series

FASTUS

2D Displacement Sensor
A Revolution in Profile Measurement

- Linearity ±0.1% of F.S.
- Sampling period 0.5 ms (max. speed)
- Superbly affordable 2D measurement

Line beam provides high-speed,high-precision measurement of height and width

Now you can perform whole-lot profile measurement on a range of production lines to ensure quality control of parts and materials. Offering superb high-speed performance and value for money, the FASTUS LS series handles high-precision 2D measurement applications that are not possible with spotbeam laser displacement sensors. The LS series is a newgeneration profile measurement sensor that opens up a new category in the field of component measurement.

Repeatability
Height (Z axis) 2 μm

Resolution
Width (X axis) 25 μm

Linearity
±0.1% of F.S.

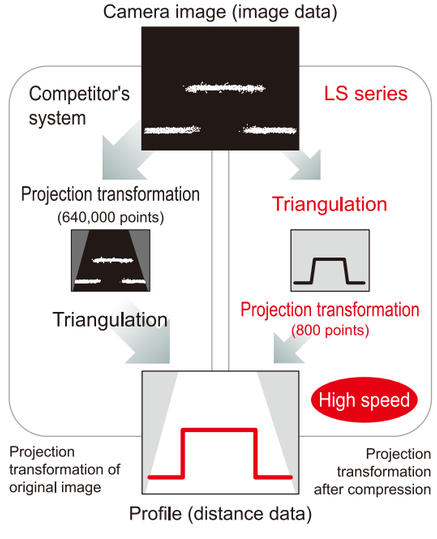
Sampling period
Max. speed 0.5 ms
Total sampling period 5 ms

Proprietary system delivers high-speed, compact size, and low price

Employing a mathematical operation known as a projection transformation, which converts a captured image into distance, allows both height and width to be measured with a high degree of precision. Moreover, the use of a proprietary method in which the projection transformation is performed after triangulation— unlike competitors' systems, which performs the projection transformation on every pixel—makes it possible to significantly compress throughput and achieve high-speed measurement. The processing unit has also been kept small, to produce a compact, low-cost product.

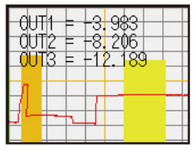
Comparison of Process Flow

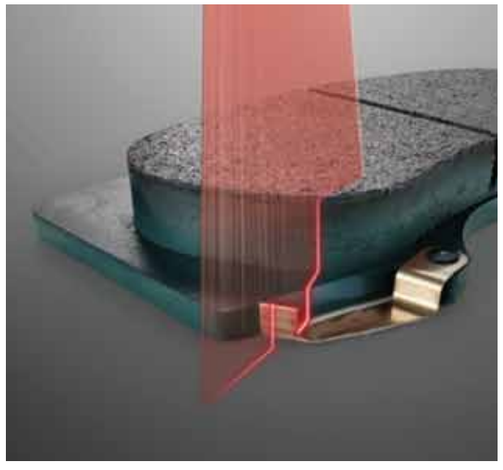
*With 800 x 800 light receiving element



Measurement of brake pad component height

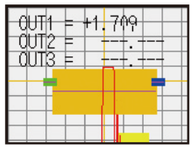
Measures the position (height) of the end of the pad wear indicator (PWI), a metal part that indicates brake wear, relative to the brake surface.

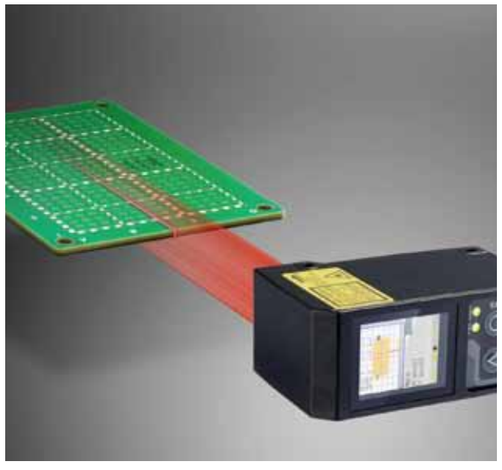




Detection of double feeding of boards

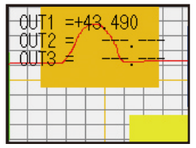
Compared to previous systems in which a displacement sensor was installed above and below the boards to measure thickness, a single LS series unit can measure from the side, providing easy installation and line design.





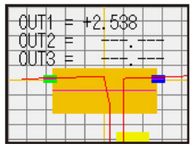
Inspection of application position/amount of sealant

By measuring sealant width and height directly after application, feedback regarding the appropriate amount and position can be provided immediately.



Inspection of gap/level difference between automobile doors

Provides quick, non-contact measurement of gap and level differences between door and chassis to check precision of automobile door installation.



Easy Setup

The LS series can be configured in four easy steps: imaging, profile, area measurement and calculation, and result judgment and output.

01 Imaging

The optimum shutter speed is set automatically, just like a regular camera.

02 Profile

A cross-sectional waveform (profile) is created from the image.
Correction is also possible.

03 Area measurement

Up to four areas can be set.
Measurement functions can be selected for each area.

Area calculation

Calculation settings can be configured as necessary.
The operators that can be used are + and -.

04 Result judgment and output

Output 1
Output 2
Output 3
Analog output

There are a total of four outputs: three control outputs and one analog output.

Functions for Stable, High-precision Measurement

Auto function

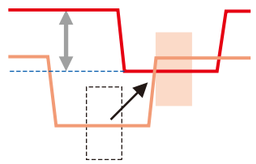
Simply set the workpiece and click “Auto Adjust” to automatically select the optimum shutter speed to suit the amount of light received from the workpiece.

Auto Adjust

AUTO

Profile correction function

The LS series is equipped with a profile correction function that corrects the positional displacement of the workpiece relative to a registered master image in terms of height, position, and tilt. Profile correction is effective on production lines where workpieces do not remain still.



Four camera modes

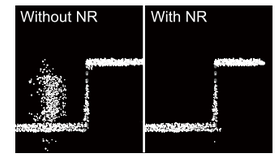
The LS series incorporates four camera modes for stable imaging: a standard, high resolution mode; high speed mode, which captures images at four times the standard speed; high dynamic range (HDR) mode, which increases the range of brightness; and noise reduction (NR) mode.

High resolution
High speed
HDR
NR

HDR mode (High Dynamic Range)

HDR mode creates a composite image from two images taken with different shutter times. This function is useful for workpieces with areas of high contrast such as mirrored metal surfaces.

NR mode (Noise Reduction)

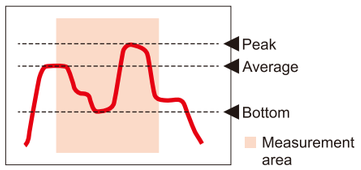


NR mode creates a composite image by amplifying an image of the bright areas and combining it with an image of the dark areas. This feature reduces noise such as ambient light.

Diverse Range of Measurement Functions

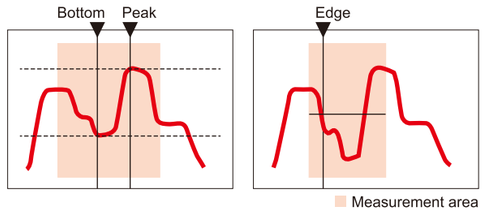
Height

Allows measurement of average, peak, and bottom heights.
The sensor outputs the average, maximum, and minimum values for the profile within the area.



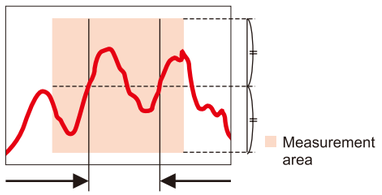
Position

Allows measurement of peak, bottom, and edge positions.



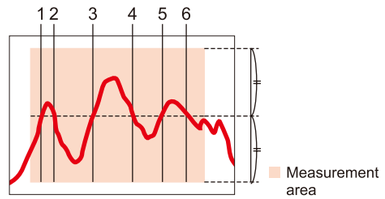
Width

Allows measurement of width of gaps and differences in level.
The sensor detects the width of the profile at the center line of the area in the height direction.



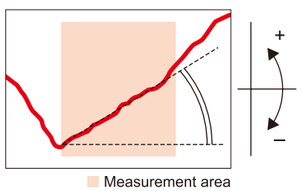
Edge count

Counts the number of times the profile crosses the center line of the area in the height direction.
This function can be used for applications such as counting the number of pins.



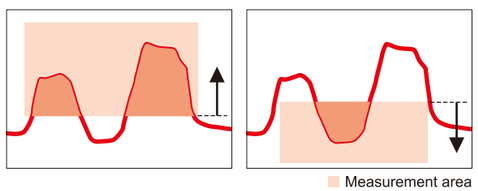
Tilt (°)

Creates a straight line approximating the profile, and then measures the tilt of this line. (Unit: °) This function measures and calculates the angle of both sides of gaps and protrusions.



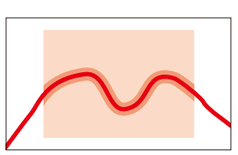
Size (mm²)

Calculates the area between the specified side of the measurement area and the profile.
Selecting “↑” measures the cross-sectional area of protrusions, while selecting “↓” measures the cross-sectional area of concave sections.



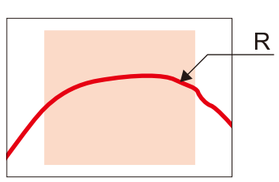
Length

Measures the length of the profile.
The value is the same even if the workpiece is misaligned, so this function can be used without position correction.



Diameter

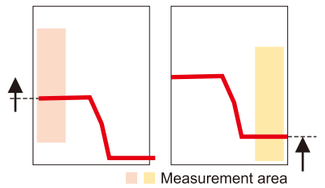
Measures the diameter of the approximate curve determined from the measured values.
This function can be used to calculate the diameter of cylinders, protrusions, and gaps.



Area calculation function provides a wider variety of measurement capabilities

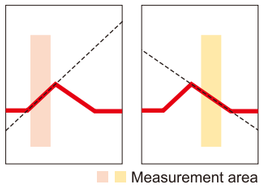
Example of level difference measurement

By measuring the height of the upper and lower surfaces of a step in two measurement areas and subtracting one from the other, it is possible to measure the difference in level. This allows you to ignore small areas of unevenness and variation, and enables more stable measurement compared to a displacement sensor.



Example of angle measurement

By measuring both angles of a feature in two measurement areas and subtracting one from the other, it is possible to measure the angle.
This lets you accurately measure the outer angle of gaps and protrusions.



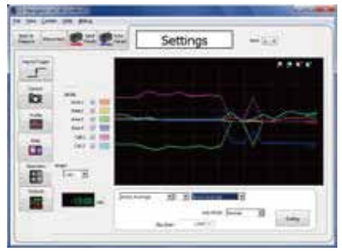
Easily Configurable PC Software

LS-Navigator (included as standard)

As standard, the LS series comes with software that lets you easily configure settings from a PC.

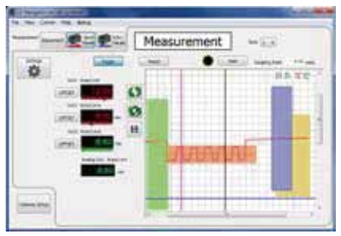
- Easy configuration of capturing area and measurement area settings
- All settings can be configured via RS-485 communication
- Profiles can also be output with high precision
- No need for expensive purpose-built displays

CD-ROM included
Software can also be downloaded from website.



Calculation settings

You can set up two calculation formulas by choosing “Calc1” and “Calc2”.



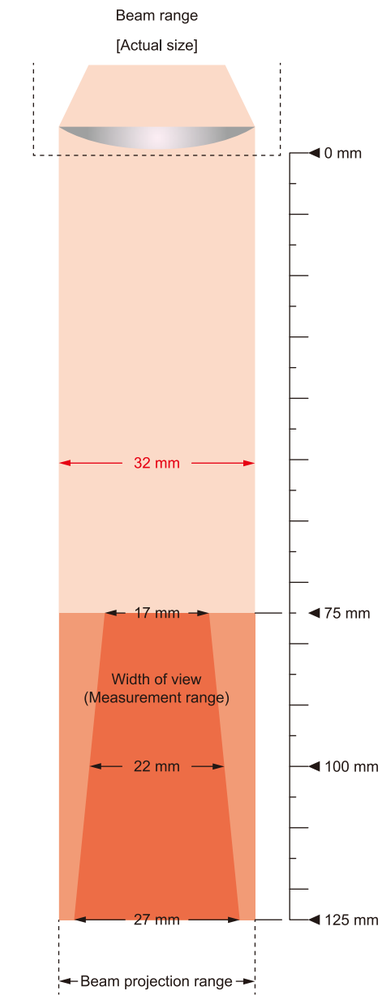
Main screen

The main screen lets you check measurement results and profiles. You can also check hold and trigger operation from this screen.

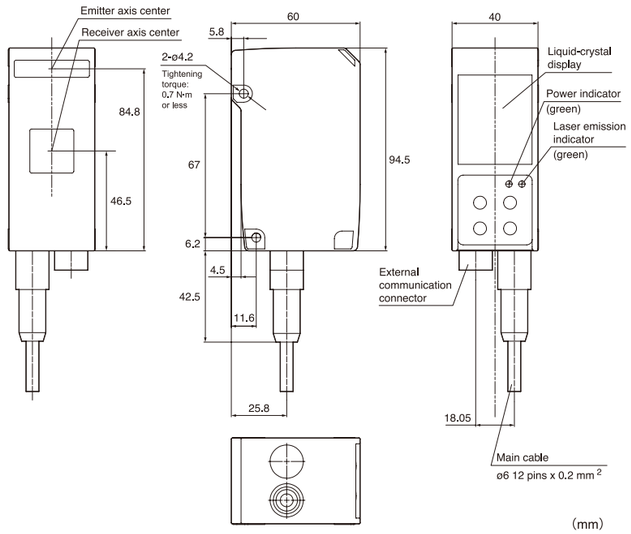
Measurement screen

Settings screens are displayed as categories in the tabs on the left of the screen.
Settings can be configured by selecting these tabs in order from top to bottom.

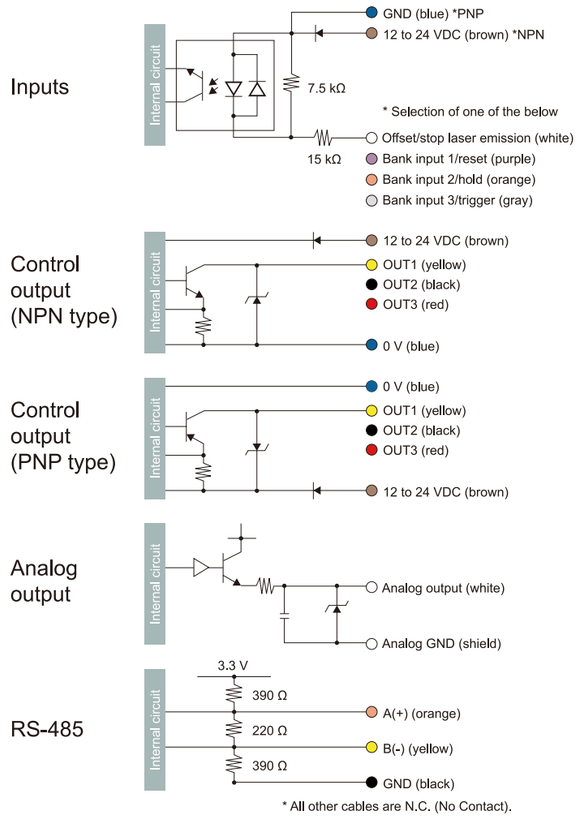
Measurement Range



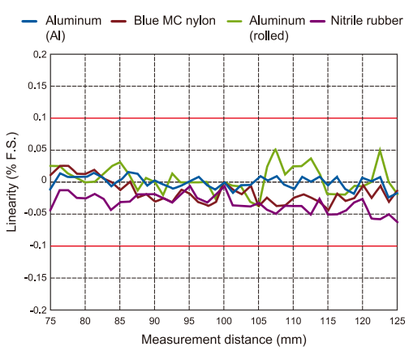
Dimensions



I/O Circuit Diagram



Z Axis Material Linearity



Options (Cables)

These cables are not included as standard. Purchase separately as needed.

Main cable

Cable for power supply, I/O, and analog output.

- 2 m STL-0H12-G02M
- 5 m STL-0H12-G05M
- 10 m STL-0H12-G10M

Specifications: ø6 12 pins x 0.2 mm²

PC connection cable (USB)

Connects sensor to PC when using PC software. RS-485-to-USB converter cable.

- 1.8 m DSL-DH06-G1M8

RS-485 communication cable (discrete wire)

Discrete wire cable for RS-485 communication.

- 2 m DOL-SH06-G02M
- 5 m DOL-SH06-G05M
- 10 m DOL-SH06-G10M

Specifications

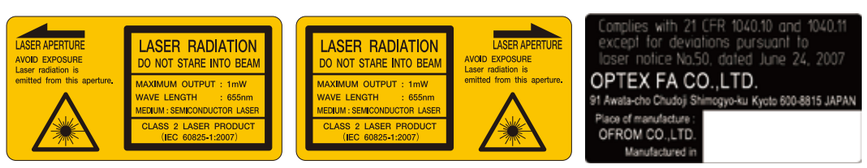
Model		LS-100CN
Measurement range		100 ± 25 mm
Width of view (at measuring distance)		17 mm (at 75 mm) - 27 mm (at 125 mm)
Light source		Red laser, wavelength: 655 nm, max. output: 1 mW
Laser class	IEC/JIS	Class 2
	FDA	CLASS II
Spot size*1		0.3 × 32 mm
Linearity	Z axis	±50 µm (±0.1% of F.S.)
Repeatability*2	Z axis	2 µm
Resolution*3	X axis	25 µm
Sampling period		Typical value: 5 ms (when measuring the whole view in "Hi-res" mode), max. speed: 0.5 ms
Display		Dot matrix display
Indicators		Power indicator (green), laser emission indicator (green)
External input		Selectable from bank, trigger, hold, reset, laser emission stop, and offset
Control output		3 NPN open collector outputs, max. 100 mA/30 VDC (max. residual voltage: 1.8 V)
Analog output		4 to 20 mA, out of measurement range: 24 mA (max. load impedance: 300 Ω)
Communication I/F		RS-485 half duplex (9.6 kbps to 4.0 Mbps)
Temperature drift (typical example)		0.05% of F.S./°C
Power supply voltage		12 to 24 VDC (+10%, -5%, including ripple)
Current consumption*4		Max. 180 mA
Protection category		IP67
Operating temperature/humidity		-10 to +40°C/35 to 85%RH (no condensation or freezing)
Storage temperature/humidity		-20 to +60°C/35 to 85%RH (no condensation or freezing)
Operating illuminance		Sunlight: 10000 lx or less, high-frequency lamp: 3000 lx or less
Vibration resistance		10 to 55 Hz; double amplitude 1.5 mm; 2 hours in each of the X, Y, and Z directions
Shock resistance		Approximately 50 G (500 m/s2), 3 times in each of the X, Y, and Z directions
Material		Housing: die-cast zinc and PC, laser emitter and receiver covers: glass
Weight		Approximately 300 g

PNP output model is LS-100CP.

*1 Defined with center strength 1/e2 (13.5%) at the center of measurement range. The sensor may be affected when leak light other than that of the specified spot size is present and when there is a highly reflective object close to the detection area.
*2 Average height measurement of a white workpiece with a center width of 5 mm, smoothing performed 8 times, moving average performed 32 times (with the default settings)
*3 With a measurement distance of 75 mm
*4 Power supply voltage: 24 VDC not including the control output load current and including the analog output

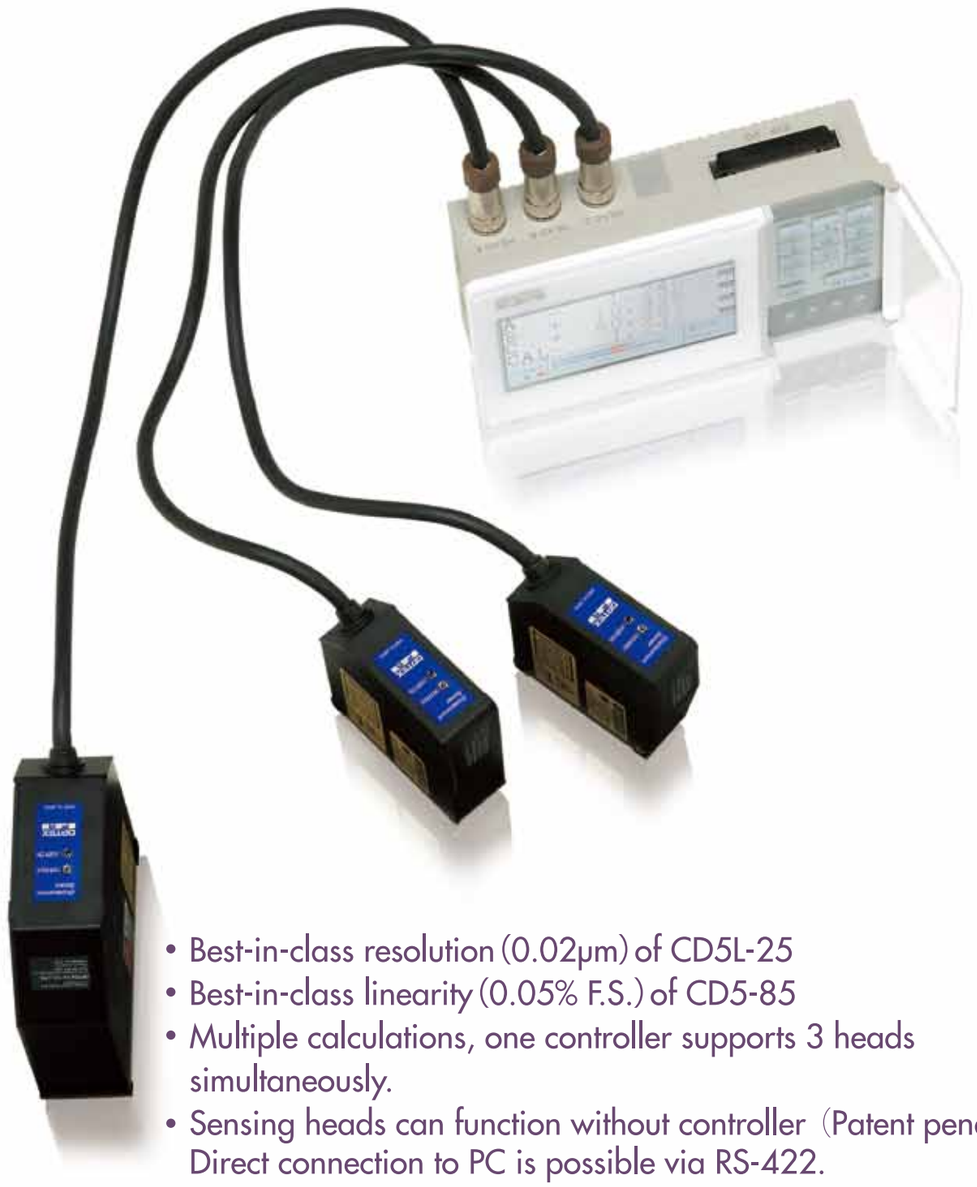
Warnings

Never look directly into a laser beam or point a laser beam at another person's eyes.
Doing so may cause eye damage and may be harmful to health.



CD5 series

World's longest sensing distance of 2 meter with fine linearity of ± 0.1% F.S.



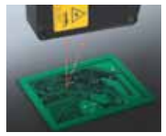
- Best-in-class resolution (0.02μm) of CD5L-25
- Best-in-class linearity (0.05% F.S.) of CD5-85
- Multiple calculations, one controller supports 3 heads simultaneously.
- Sensing heads can function without controller (Patent pending). Direct connection to PC is possible via RS-422.

SENSORHEAD VARIATION

CD5-30 (Narrow spot)
CD5-W30 (Wide spot)

Short distance
5 times better resolution than conventional model

Diffuse type
Measurement range : 30 ±5mm
Resolution : 0.2 μm
Linearity : ±0.08% F.S.

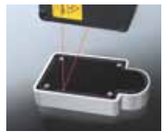


Specular mode
Measurement range : 26.1 ±2.5mm
Resolution : 0.1 μm
Linearity : ±0.08% F.S.

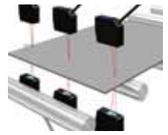
CD5-85 (Narrow spot)
CD5-W85 (Wide spot)

Middle distance
Highest level of linearity in this class

Diffuse type
Measurement range : 85 ±20mm
Resolution : 1 μm
Linearity : ±0.05% F.S.



Specular mode
Measurement range : 82.3 ±10mm
Resolution : 0.5 μm
Linearity : ±0.08% F.S.



CD5-150 (Narrow spot)
CD5-W150 (Wide spot)

Semi long distance
Highest level of linearity in this class

Diffuse type
Measurement range : 150 ±40mm
Resolution : 2 μm
Linearity : ±0.05% F.S.

CD5-W350 (Wide spot)

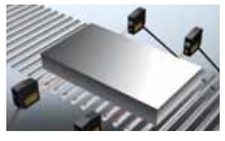
Long distance
High accuracy & stability by wide spot

Diffuse type
Measurement range : 350 ±100mm
Resolution : 5 μm
Linearity : ±0.08% F.S.

CD5-W500 (Wide spot)

Super long distance
Highest level of accuracy for this range

Diffuse type
Measurement range : 500 ±200mm
Resolution : 10 μm
Linearity : ±0.08% F.S.



CD5-W2000 (Wide spot)

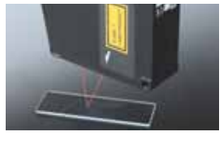
Ultra long distance
This longest range in the industry

Diffuse type
Measurement range : 2000 ±500mm
Resolution : 30 μm
Linearity : ±0.1% F.S.

CD5-L25 (Narrow spot)
CD5-LW25 (Wide spot)

For transparent and specular objects
Measurement of glass thickness is available

Specular type
Measurement range : 25 ±1mm
Resolution : 0.02 μm
Linearity : ±0.08% F.S.



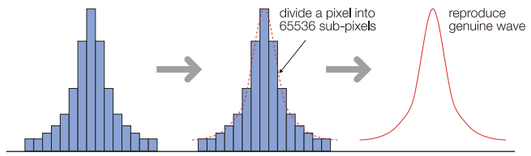
CD5 SENSOR HEADS

The CD5 series uses OPTEX FA's original design cutting edge technology to achieve high accuracy measurement

Digital sub-pixel processing

Accurate profile reproduction

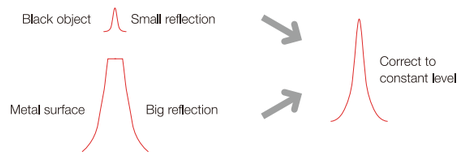
The linearity has been improved to more than twice that of a conventional product by digital sub-pixel processing. This divides one pixel into 65536 sub-pixels.



High resolution electronic shutter

Automatic level correction

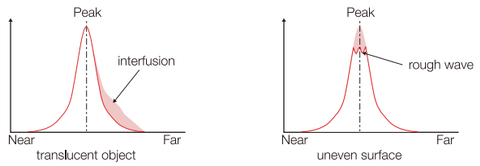
A high resolution electronic shutter that can be controlled to 1/485th of the sampling period helps to insure stable peak level detection even when unstable surface conditions exist.



For uneven and varied luster object

Original algorithm

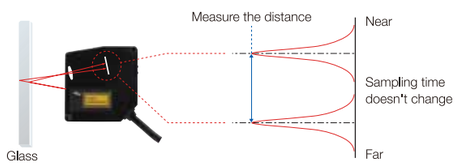
Even if the object is translucent or its surface is uneven, it can detect the position of the true peak thanks to the original Optex designed algorithm.



Standalone operation - no controller required

Reliable glass thickness measurement

The Specular type CD5-L25/CD5-LW25 can detect both the surface of glass and measure the thickness without being connected to the controller.



Control unit UQ1 series to connect sensor head to MITSUBISHI PLC MELSEC-Q series directly

UQ1-01 enables easy connection of CD5 and MITSUBISHI PLC MELSEC-Q series. UQ1 setup the sensor head automatically. You don't have to have big ladder proglam.

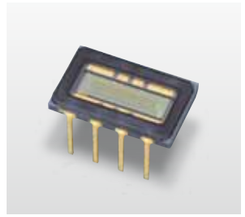
→P313

LS
CD5
CD4
CD33
CD3
CD22
CD1
UQ1

High accuracy, high speed, high sensitivity

High sensitivity linear image sensor

The CD5 series offers 5 times higher accuracy and 10 times higher speed than a conventional product.



Low aberration lens

"Multi-CLD" lens

Newly developed lens used in the receiver projects a clear image on the image sensor with very little aberration.

Multi-CLD: Multi Combined Low Dispersion

High speed and high accuracy

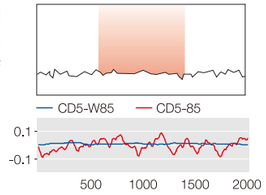
High speed processing unit

The newly developed processing unit is able to process the measurement data at high speed. It is also able to correct for any distortion and accurately compensates for variations in the readings.

Highly stable linearity

Wide spot type

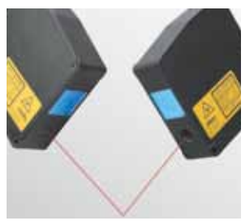
The wide spot type can measure rough surfaces with a high degree of linearity and stability.



Cross-talk prevention

Preventing cross-talk (world's first)

The newly developed cross-talk prevention function eliminates interference between sensors even when the beams are crossing or are mounted close together.



Sampling period will be 6 times longer

Water resistance

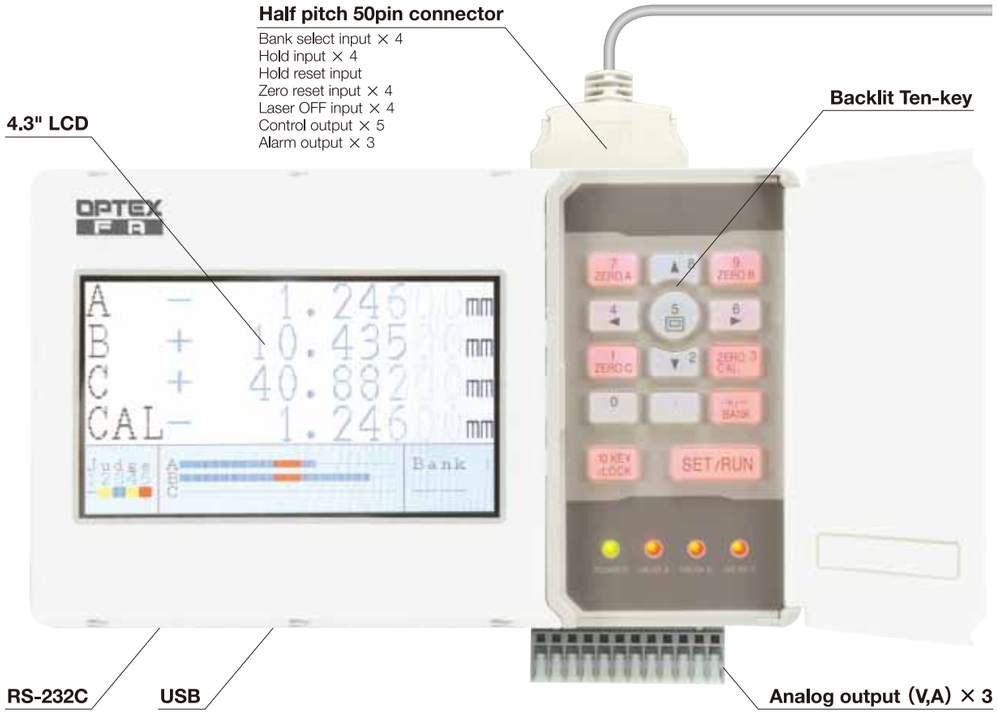
IP67

The CD5 series has an IP67 rating not only at the sensor body but also on the extension cable connector. Additional countermeasures to protect the cable from water are not required.

Note: Water droplets on the optical part may cause faulty readings and problems with the measurement.

CD5 CONTROLLERS

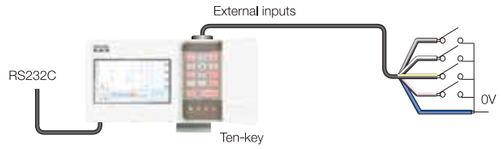
Multiple interface for PC, PLC, etc.



Multiple SETUP is available

16 Banks for SETUP

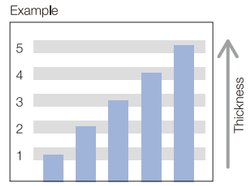
You can setup 16 sets of measurement parameter for 16 application. Bank is changed by Ten-key, external inputs and RS-232C communication.



Effective for sorting

5 Outputs have individual threshold

5 Outputs that have individual threshold, upper and lower limit, is available. This is effective for sorting application.



Wave monitoring without PC or external monitor

Wave monitoring function

You can monitor the wave form and verify if the sensor head and object position are correct by using the wave monitoring function.

Easy SETUP

Backlit Ten-key

Backlit Ten-key display panel shows which keys are active.

Multi measurement with one controller

3 heads multi calculation (world's first)

Up to three sensor heads can be connected to one controller unit. Calculation with result from three heads is available that can be used to solve various applications

- Levelness
- Contortion
- Warpage
- Level difference
- Thickness
- Shifting

Easy SETUP

Backlit Ten-key and display guide

Setup of basic sensor parameter and calibration are easily done by Backlit ten-key and display. Backlit ten-key panel shows which keys are active.

From remote place

Up to 50m

Controller can be located up to a maximum distance of 50m from the sensor head. By interconnecting the cable DSL-1212-G05M.

Controllable from PC remotely

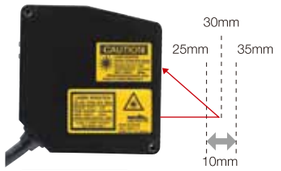
USB and RS-232C

Controller has USB and RS-232C port so that you can controll sensor heads effectively and flexibly.

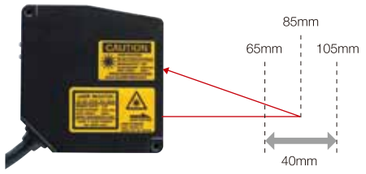
SYSTEM PART NUMBERS

Sensorhead

CD5-30 / **CD5-W30** Short range : 30 ±5mm

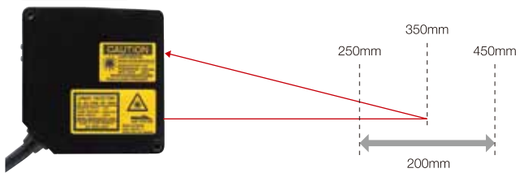


CD5-85 / **CD5-W85** Middle range : 85 ±20mm

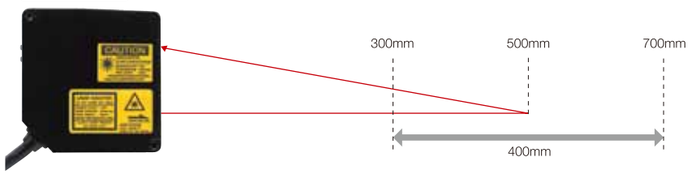


CD5-150 / **CD5-W150** Middle range : 150 ±40mm

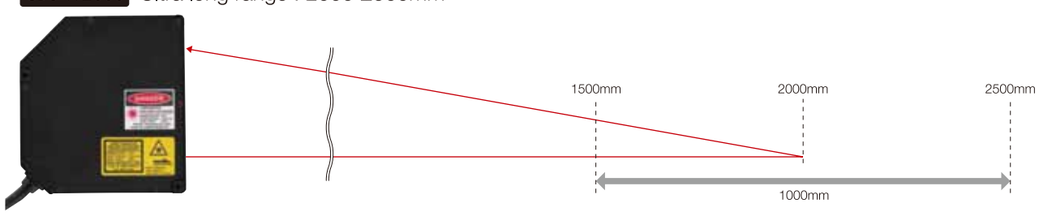
CD5-W350 Long range : 350 ±100mm



CD5-W500 Super long range : 500 ±200mm



CD5-W2000 Ultra long range : 2000 ±500mm



CD5-L25 / **CD5-LW25** Specular type : 25 ±1mm

CD5-30 / **CD5-W30** Specular mode : 26.1 ±2.5mm

CD5-85 / **CD5-W85** Specular mode : 82.3 ±10mm

Controller

Model No. : CD5A-N (NPN), CD5A-P (PNP)
Type : CD5 controller
Description : Controller unit for CD5 system with 4.3" TFT LCD and Backlit Ten-key
Interface : Analog output NPN input/output, RS-232C, USB

Option

Cable for sensor head and controller

DSL-1212-G02M : 2m
Cable for sensor head to connect controller that can be connected in serial up to 50m

DSL-1212-G05M : 5m
Cable for sensor head to connect controller that can be connected in serial up to 50m

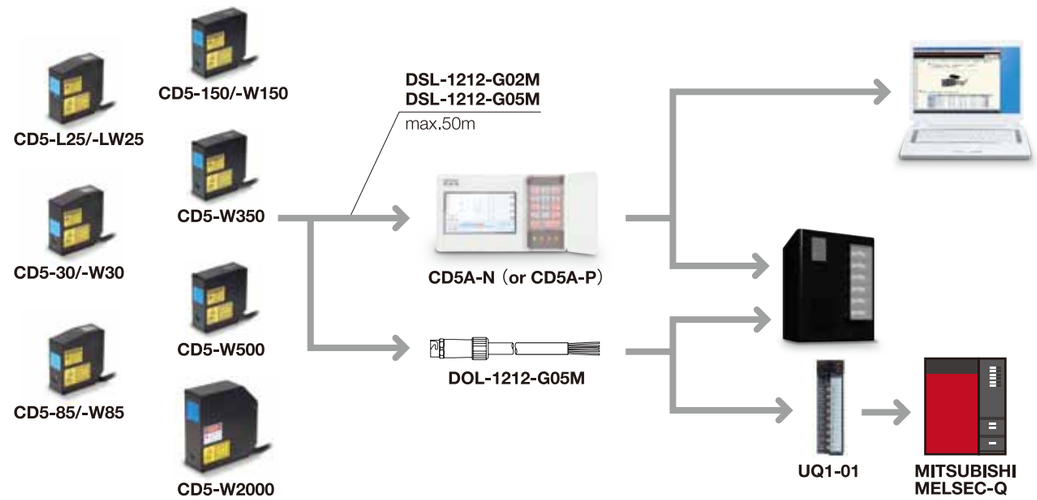
I/O Connector cable

IO-EXP-AOD5 : 3m
IEEE1284 half pitch 50pin

Cable for sensor head

DOL-1212-G05M : 5m
Cable for sensor head when use without controller

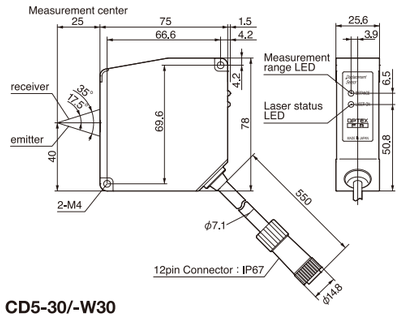
System configuration example



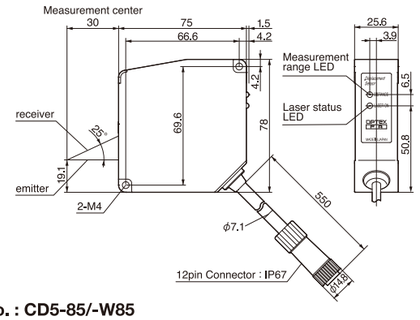
Dimensions

Sensor head

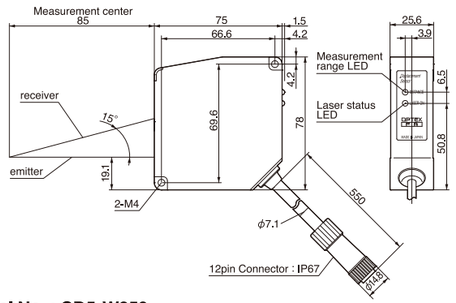
Model No. : CD5-L25/-LW25 (Specular type)



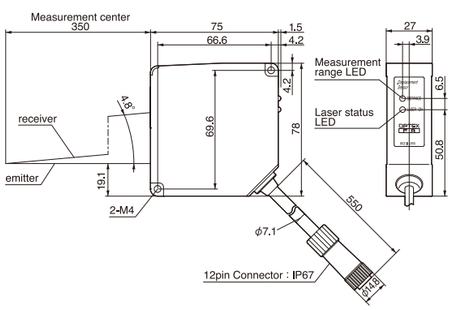
Model No. : CD5-30/-W30



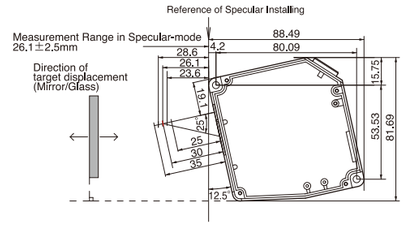
Model No. : CD5-85/-W85



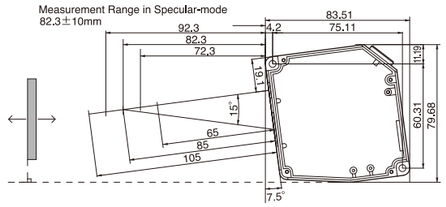
Model No. : CD5-W350



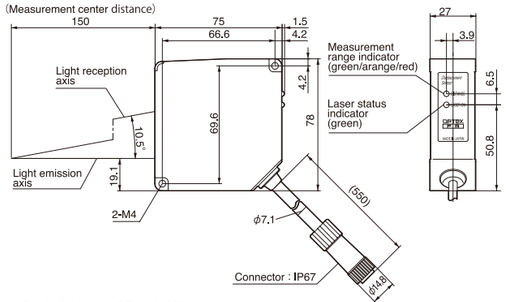
Model No. : CD5-30 / W30 (Specular mode)



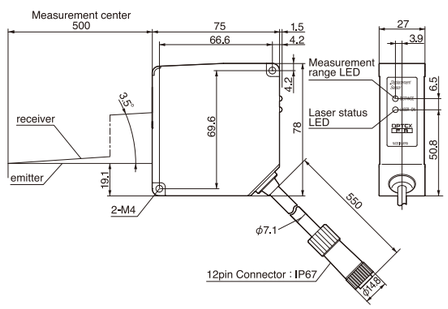
Model No. : CD5-85 / W85 (Specular mode)



Model No. : CD5-150/CD5-W150

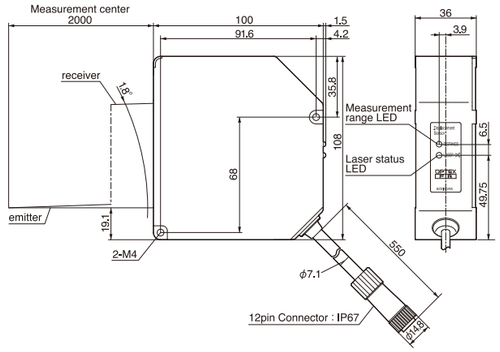


Model No. : CD5-W500



(mm)

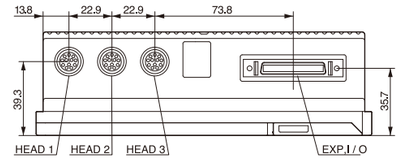
Model No. : CD5-W2000

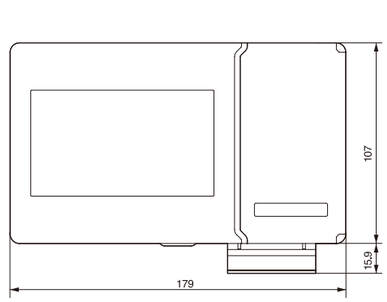


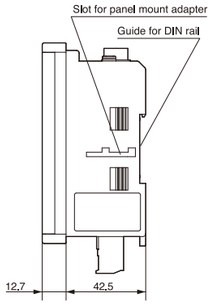
(mm)

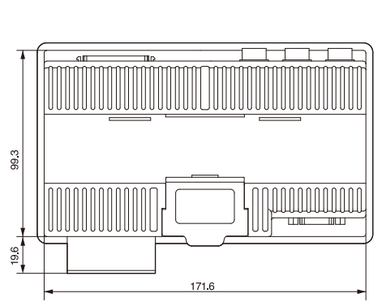
Controller

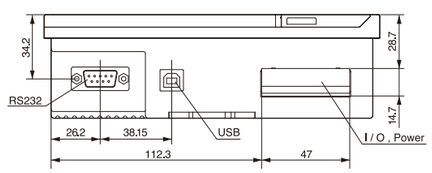
Model No. : CD5A-N(-P) common in NPN and PNP types











(mm)

Accessories

Control unit UQ1

Model No.: UQ1-01
: Control unit for CD5 sensor head to connect to Mitsubishi PLC MELSEC-Q series directly.

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Specifications

Controller

Model	CD5A-N (NPN input / output type)	CD5A-P (PNP input / output type)
Number of heads	Max. 3pcs	
Supply voltage	12 - 24VDC ±10%	
Power consumption	350mA / 24VDC (When connected with 3 sensor heads. Including analog current output)	
Temp drift	±0.01% F.S. / °C	
Interface	RS232 / USB	
Analog output	Voltage output ± 10V / F.S. (Output impedance 100Ω) Current output 4 to 20mA / F.S. (Load impedance max.300Ω)	
Alarm output	NPN open collector	PNP open collector
	Max. 100mA / 24V DC (residual voltage max. 1.8V) Turns ON when the sensor head fails in measurement.	
Control output	NPN open collector	PNP open collector
	Max. 100mA / 24V DC (residual voltage max. 1.8V) HI / LO setting for each line and hysteresis setting are available.	
Bank select input	Turns ON when connected to GND	Turns ON when connected to 12 - 24VDC
	16 banks selectable	
Hold input	Turns ON when connected to GND	Turns ON when connected to 12 - 24VDC
	Measurement value holding (selectable in the menu)	
Zero reset input	Turns ON when connected to GND	Turns ON when connected to 12 - 24VDC
	Zero reset of Head A measurement value / Head B measurement value / Head C measurement value / Calculation value is available.	
Laser off input	Turns ON when connected to GND	Turns ON when connected to 12 - 24VDC
	Laser shutoff of Head A / Head B / Head C is available.	
Optional features	Calculation setting (calculation formula, measurement value increase / decrease direction, value of K, shift), hold settings, filter setting (filter, cut-off frequency), memory bank setting, RS232 setting, memory copying function, measurement value display digit number setting, display brightness setting, key illumination setting	
Display	4.3" TFT LCD	
Protection category	IP20	
Operating temp / humidity	−10 to +50°C (No condensation) / 35 to 85% RH	
Storage temp / humidity	−20 to +60°C (No condensation) / 35 to 85% RH	
Vibration resistance	10 to 55Hz, Double amplitude 1.5mm, 2h for XYZ axes	
Shock resistance	20G(196m/s²) , 3 times for XYZ axes	
Material	Chassis: Polycarbonate, connection terminals : Nylon 66	
Weight	Approx. 550 g (Including connection terminals)	

Sensor head

Model		CD5-L25	CD5-LW25	CD5-30		CD5-W30	
Optical method		Specular reflection		Diffuse reflection	Specular mode	Diffuse reflection	Specular mode
Measurement dist.		25mm		30mm	26.1mm	30mm	26.1mm
Measurement range		±1mmn		±5mm	±2.5mm	±5mm	±2.5mm
Light source		Red laser diode					
		Wavelength 650nm / Maximum output 390μW		Wavelength 650nm / Maximum output 1mW		Wavelength 658nm / Maximum output 1mW	
Laser class	IEC/JIS	Class 1		Class 2			
	FDA	CLASSII					
Spot size (*1)		Appx.25×35μm	Appx.100×700μm	Appx.30×100μm		Appx.260×1,000μm	
Light receiving element		Linear image sensor					
Linearity		±0.08%F.S.					
Resolution (*2)		0.02μm		0.2μm	0.1μm	0.2μm	0.1μm
Sampling period (*3)		100 / 200 / 400 / 800 / 1600 / 3200μs Setup to be done through the controller (CD5A series)					
Temperature drift (*4)		±0.01% F.S. / ℃	±0.05% F.S. / ℃	±0.01% F.S. / ℃			
Serial I/F		RS-422 9.6k to 1843.2kbps					
Supply voltage		12 - 24VDC ±10% or from controller (CD5A series)					
Indicator		Laser emission indicator : Green (ON during laser emission)					
		Distance indicator : Orange (Lights around center) Distance indicator : Green (Lights at the far side)					
		Distance indicator : Red (Lights at the near side) Distance indicator : Alternative Red / Green(Out of range)					
Protection category		IP67 (Including connecting part)					
Operating temp / humidity		−10 to +50℃ (No condensation) / 35% to 85%RH					
Storage temp / humidity		−20 to +60℃ (No condensation) / 35% to 85%RH					
Ambient illuminance		Max. 3,000lx (Surface illuminance, incandescent lamp)					
Vibration resistance		10 to 55Hz Double amplitude 1.5mm 2 h per XYZ axes					
Shock resistance		50G (500m/S²) X,Y,Z 3times					
Cable extension		Up to 50 m using an optional extension cable (unbundled)					
Material		Sensor head housing : Diecast aluminum cover of emitting / receiving part : Glass					
Weight		Appx. 250 g (Including cable)					

Model		CD5-85		CD5-W85		CD5-150	CD5-W150
Optical method		Diffuse reflection	Specular mode	Diffuse reflection	Specular mode	Diffuse reflection	
Measurement dist.		85mm	82.3mm	85mm	82.3mm	150mm	
Measurement range		±20mm	±10mm	±20mm	±10mm	±40mm	
Light source		Red Laser Diode					
		Wavelength 650nm / Maximum output 1mW		Wavelength 658nm / Maximum output 1mW		Wavelength 650nm / Maximum output 1mW	Wavelength 658nm / Maximum output 1mW
Laser class	IEC/JIS	Class 2					
	FDA	CLASSII					
Spot size (*1) (μm)		Appx.70×29		Appx.260×1200		Appx.180	Appx.330×1,600
Light receiving element		Linear image sensor					
Linearity		±0.05% F.S.	±0.08% F.S.	±0.05% F.S.	±0.08% F.S.	±0.05% F.S.	
Resolution (*2)		1μm	0.5μm	1μm	0.5μm	2μm	
Sampling period (*3)		100 / 200 / 400 / 800 / 1600 / 3200μs Setup to be done through the controller (CD5A series)					
Temperature drift (*4)		±0.01% F.S. / ℃					
Serial I/F		RS-422 9.6k to 843.2kbps					
Supply voltage		12 - 24VDC ±10% or from controller (CD5A series)					
Indicator		Laser emission indicator : Green (ON during laser emission)					
		Distance indicator : Orange (Lights around center) Distance indicator : Green (Lights at the far side)					
		Distance indicator : Red (Lights at the near side) Distance indicator : Alternative Red / Green(Out of range)					
Protection category		IP67 (Including connecting part)					
Operating temp / humidity		−10 to +50℃ (No condensation) / 35% to 85%RH					
Storage temp / humidity		−20 to +60℃ (No condensation) / 35% to 85%RH					
Ambient illuminance		Max. 3,000lx (Surface illuminance, Incandescent lamp)					
Vibration resistance		10 to 55Hz Double amplitude 1.5mm 2 h per XYZ axes					
Shock resistance		50G (500m/s²) X,Y,Z 3times					
Cable extension		Up to 50 m using an optional extension cable (unbundled)					
Material		Sensor head housing : Diecast aluminum cover of emitting / receiving part : Glass					
Weight		Appx. 250 g (Including cable)					

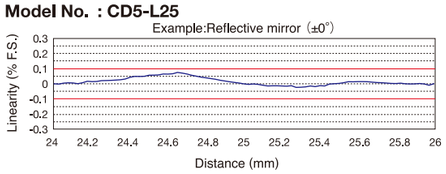
Model		CD5-W350	CD5-W500	CD5-W2000
Optical method		Diffuse reflection		
Measurement dist.		350mm	500mm	2000mm
Measurement range		±100mm	±200mm	±500mm
Light source		Red Laser Diode		
		Wavelength 658nm / Maximum output 1mW		Wavelength 658nm / Maximum output 5mW
Laser class	IEC/JIS	Class 2		Class 3R
	FDA	CLASSII		CLASS IIIa
Spot size (*1) (μm)		Appx.700×2,400	Appx.1,000×3,700	Appx.2,100×7,800
Light receiving element		Linear image sensor		
Linearity		±0.08% F.S.	±0.08% F.S.	±0.1% F.S.
Resolution (*2)		5μm	10μm	30μm
Sampling period (*3)		100 / 200 / 400 / 800 / 1600 / 3200μs Setup to be done through the controller (CD5A series)		
Temperature drift (*4)		±0.01% F.S. / ℃		±0.05% F.S. / ℃
Serial I/F		RS-422 9.6k to 843.2kbps		
Supply voltage		12 - 24VDC ±10% or from controller (CD5A series)		
Indicator		Laser emission indicator : Green (ON during laser emission)		
		Distance indicator : Orange (Lights around center) Distance indicator : Green (Lights at the far side)		
		Distance indicator : Red (Lights at the near side) Distance indicator : Alternative Red / Green(Out of range)		
Protection category		IP67 (Including connecting part)		
Operating temp / humidity		−10 to +50℃ (No condensation) / 35% to 85%RH		
Storage temp / humidity		−20 to +60℃ (No condensation) / 35% to 85%RH		
Ambient illuminance		Max. 3,000lx (Surface illuminance, Incandescent lamp)		
Vibration resistance		10 to 55Hz Double amplitude 1.5mm 2 h per XYZ axes		
Shock resistance		50G (500m/s²) X,Y,Z 3times		
Cable extension		Up to 50 m using an optional extension cable (unbundled)		
Material		Sensor head housing : Diecast aluminum cover of emitting / receiving part : Glass		
Weight		Appx. 250 g (Including cable)		Appx. 450 g (Including cable)

〈Measurement condition〉
Unless otherwise designated, measurement condition is as follows. Using special controller / operating temperature, 23℃ (ordinary temperature) / supply voltage, 24 V DC / sampling period : 100μs (CD5-W350 / -W500 / -W2000 : 800μs) 256 times in average / center / standard testing object (specular reflection: evaporated aluminum mirror, diffuse reflection: white ceramic) / digital measured value.

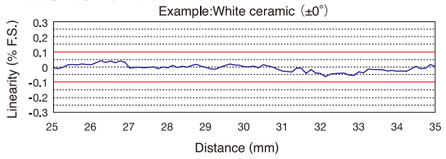
*1 Defined with center strength 1/e² (13.5%) at the center. There may be leak light other than the specified spot size. The sensor may be affected when there is a highly reflective object close to the detection area.
*2 4096 times in average. Other conditions are same as the above condition.
*3 Default setting of sampling period is as follows.
CD5-□□25～□150 :100μs
CD5-W350～W2000 :800μs
*4 The typical value in the above condition.

Linearity (Typical example data)

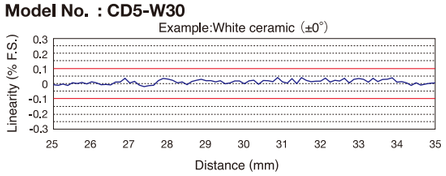
Model No. : CD5-L25



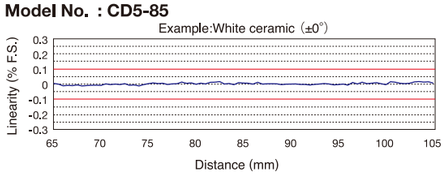
Model No. : CD5-30



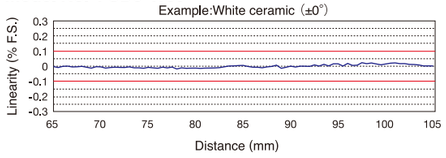
Model No. : CD5-W30



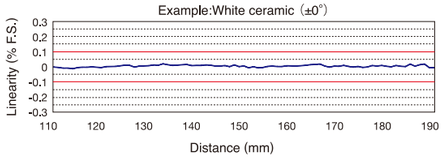
Model No. : CD5-85



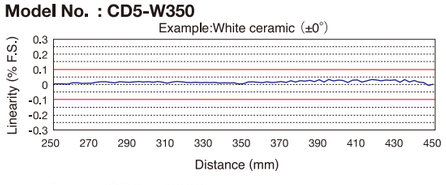
Model No. : CD5-W85



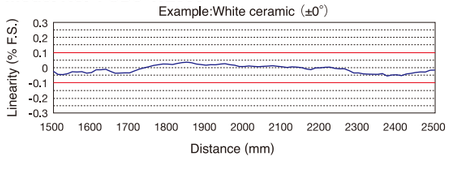
Model No. : CD5-150



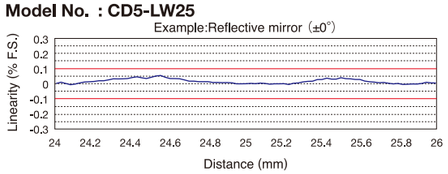
Model No. : CD5-W350



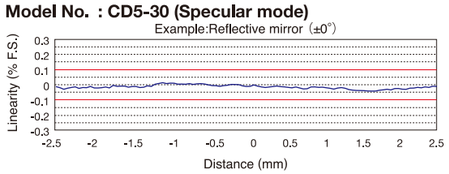
Model No. : CD5-W2000



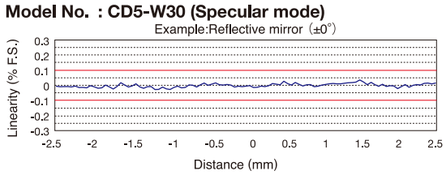
Model No. : CD5-LW25



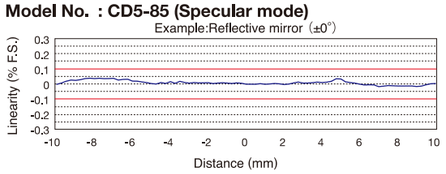
Model No. : CD5-30 (Specular mode)



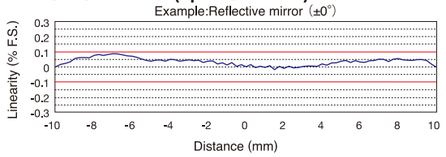
Model No. : CD5-W30 (Specular mode)



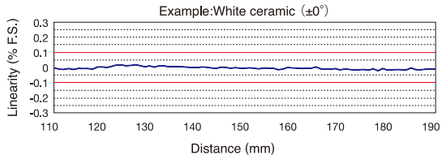
Model No. : CD5-85 (Specular mode)



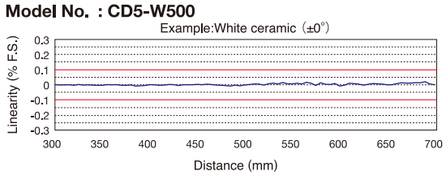
Model No. : CD5-W85 (Specular mode)



Model No. : CD5-W150

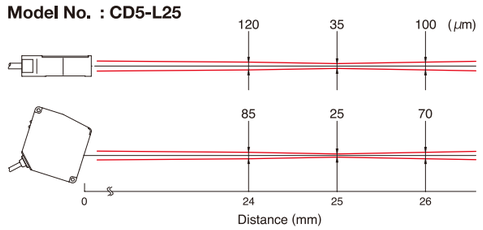


Model No. : CD5-W500

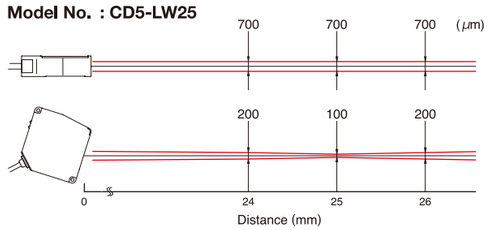


Spot size

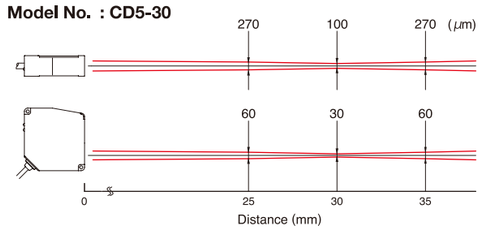
Model No. : CD5-L25



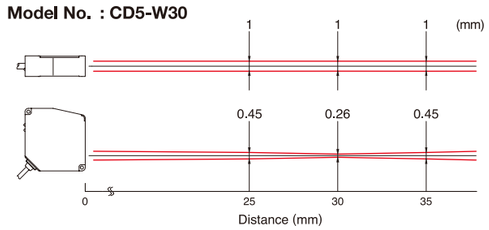
Model No. : CD5-LW25



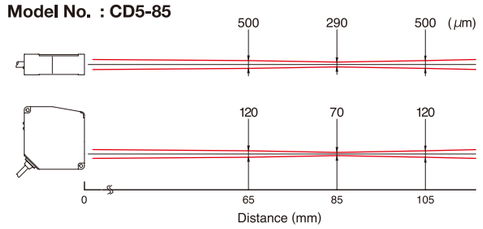
Model No. : CD5-30



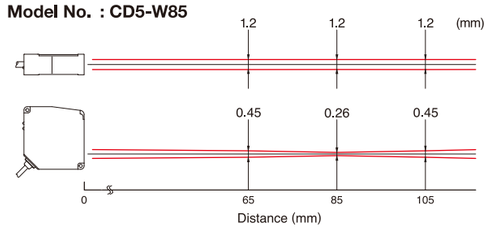
Model No. : CD5-W30



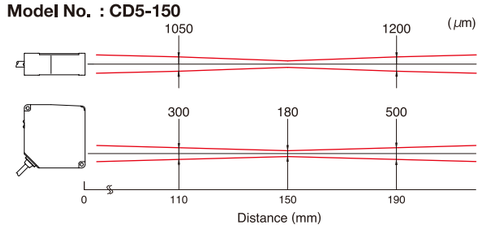
Model No. : CD5-85



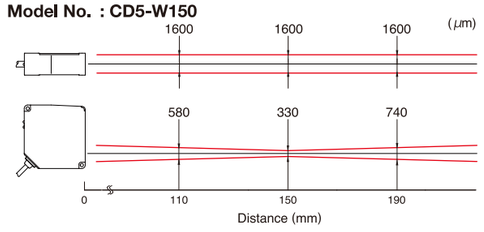
Model No. : CD5-W85



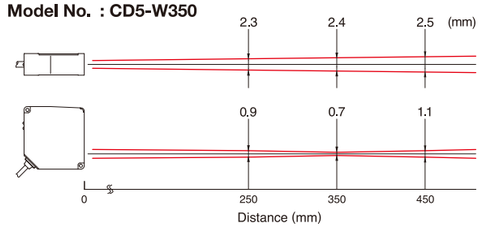
Model No. : CD5-150



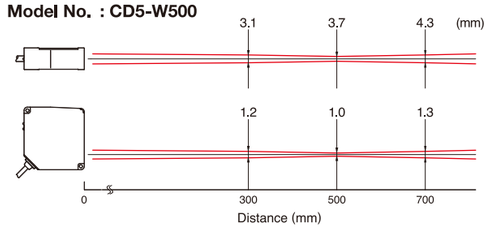
Model No. : CD5-W150



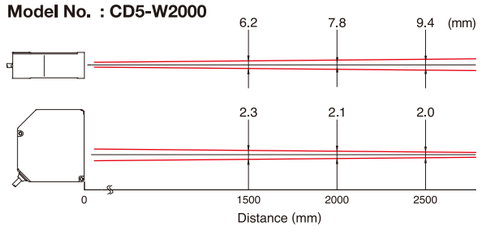
Model No. : CD5-W350



Model No. : CD5-W500

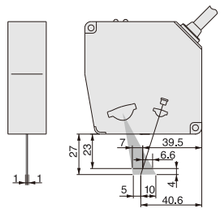


Model No. : CD5-W2000

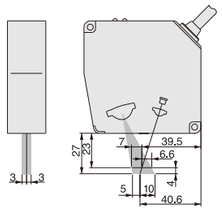


Interference area

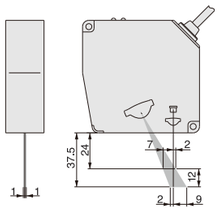
Model No. : CD5-L25



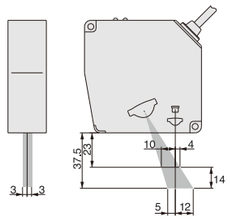
Model No. : CD5-LW25



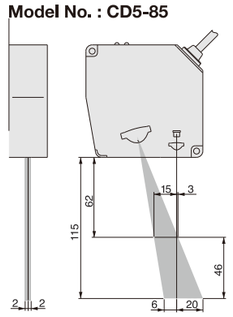
Model No. : CD5-30



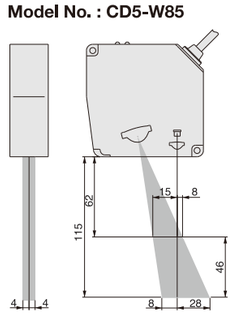
Model No. : CD5-W30



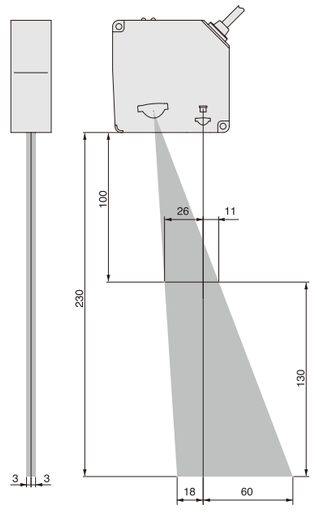
Model No. : CD5-85



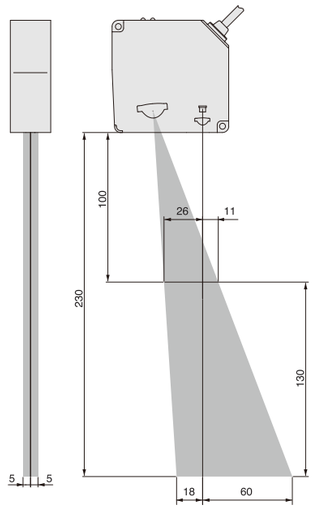
Model No. : CD5-W85



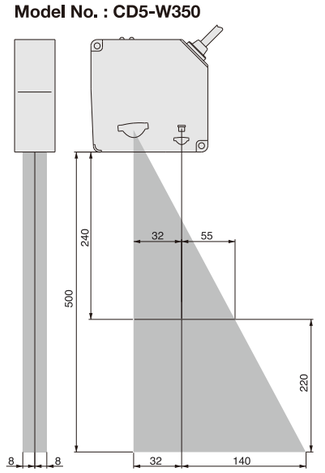
Model No. : CD5-150



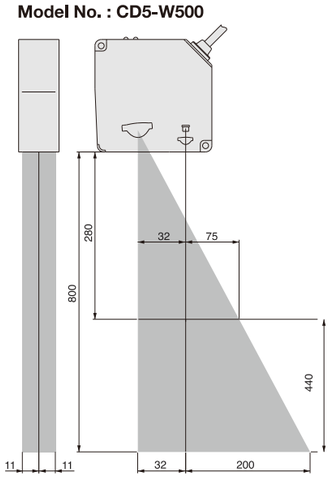
Model No. : CD5-W150



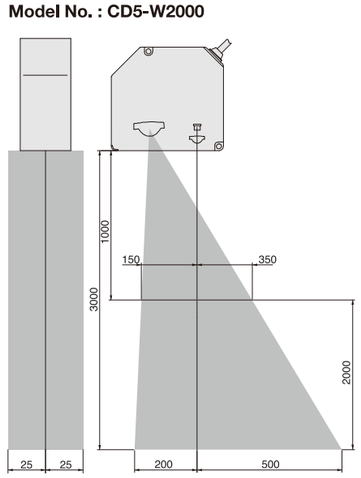
Model No. : CD5-W350



Model No. : CD5-W500



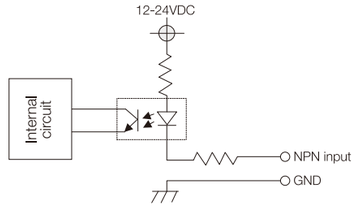
Model No. : CD5-W2000



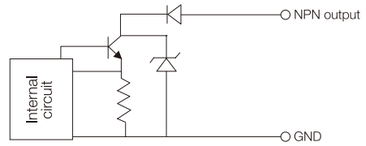
(mm)

Input / Output diagrams

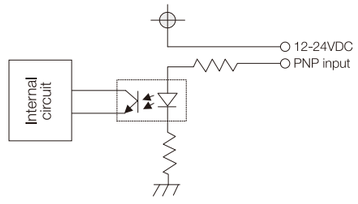
NPN model
Bank input
Hold input
Zero reset input
Laser off input



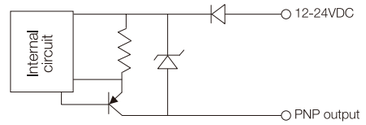
NPN model
Control output
Alarm output



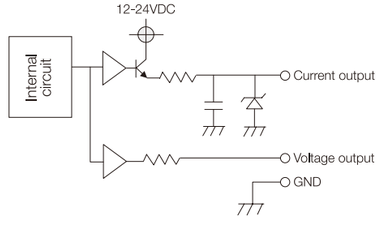
PNP model
Bank input
Hold input
Zero reset input
Laser off input



PNP model
Control output
Alarm output



Analog output



CD4 series

CD4 Series with linear image sensor and electronic shutter provides accurate measurement.

- Laser displacement sensor features easy setup and operation.
- High accuracy of 0.1μm resolution and ±0.1% F.S. linearity. (Specular Type)
- Specular type (CD4L-25) optics that are ideal for glass sensing.

SENSORHEAD VARIATION

〈For general use〉

Regular type

CD4-30 (IEC Class 2「FDA CLASS II」Type)
CD4-30-3R (High power Class 3R Type)

Short distance
Tire inspection

Measurement range : 30 ±5mm
Resolution : 1 μm
Linearity : ±0.1% F.S.

Regular type

CD4-85 (IEC Class 2「FDA CLASS II」Type)
CD4-85-3R (High power Class 3R Type)

Middle distance
Checking clear package of IC mounted on PCB

Measurement range : 85 ±20mm
Resolution : 3 μm
Linearity : ±0.1% F.S.

Regular type

CD4-350 (IEC Class 2「FDA CLASS II」Type)
CD4-350-3R (High power Class 3R Type)

Long distance
Monitoring the die cast

Measurement range : 350 ±100mm
Resolution : 40 μm
Linearity : ±0.1% F.S.

〈For glass material〉

Specular type

CD4L-25 (IEC Class 1「FDA CLASS II」Type)

Specular type
Monitoring warping sagging of glass plate

Measurement range : 25 ±1mm
Resolution : 0.1 μm
Linearity : ±0.1% F.S.

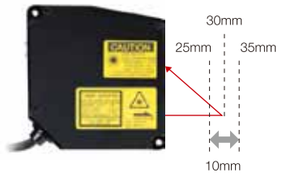
CD4 SENSOR HEADS

CD4 Series laser displacement sensor with linear image sensor and electronic shutter provides accurate measurement.

Measuring range

〈**General use**〉

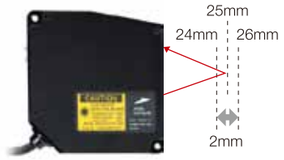
CD4-30
CD4-30-3R
Short range : 30 ±5mm



〈**Glass material**〉

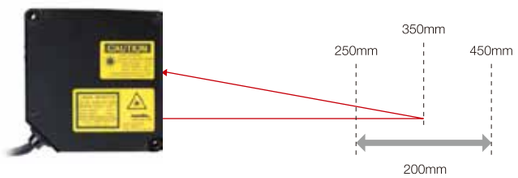
CD4I-25 Specular type : 25 ±1mm

The optical path is designed to project the correct angle for the detection of specular reflections from transparent objects.



CD4-85
CD4-85-3R
Middle range : 85 ±20mm

CD4-350
CD4-350-3R
Long range : 350 ±100mm



Class 2 (IEC/JIS) CLASS II (FDA) laser product

CD4-30 CD4-85 CD4-350

High power type (models with "-3R") has class 3 laser

Class 3R - High power types

CD4-30-3R CD4-85-3R CD4-350-3R

For matte black objects or any application that requires a higher power laser, there are models of the CD4 series available which use a Class 3R light source.

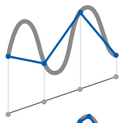
Class 1 (IEC/JIS) CLASS II (FDA) laser product

CD4L-25

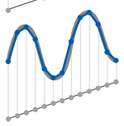
CD4L-25 is registered to CDRH. (Center of devices and radiological health)

High speed sampling rate

The CD4 Displacement sensor has a 100μsec. sampling rate and high density linear image detector.



Conventional displacement sensor with slow response.



CD4 Series sensors, high speed sampling rate improves overall accuracy.

IP67 Environmental rating

The sensing heads of the CD4 series have an IP67 rating for use in applications where they may be exposed to water.

CD4 CONTROLLERS

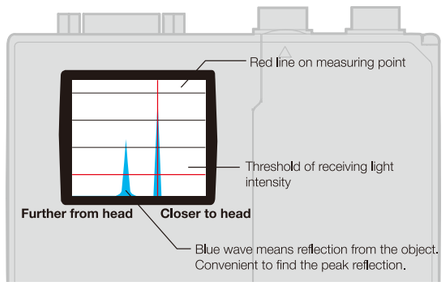
The CD4 controller is easy to operate with simple pushbutton setup and an LCD display to verify / change the settings.

LCD Display

The CD4A-N(or P) controller has a built-in color display that indicates multiple data values on the same screen.
Distance values from both heads, calculated value, output status, bank number, etc. are displayed on the normal run screen.

Light intensity monitor (For CD4L-25 only)

For stable measurement and improved accuracy the light intensity needs to be adjusted to the optimum setting.
With the built-in monitor the status of the level can be verified.



Ten formulas of calculation

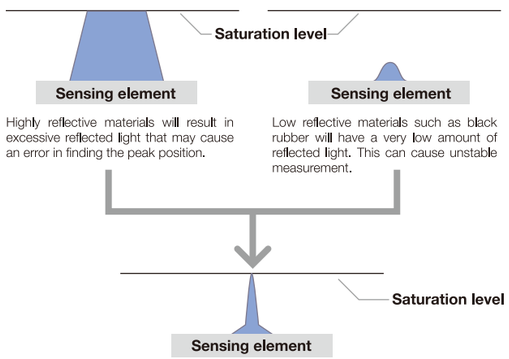
A	Sensor head A
B	Sensor head B
A+B	Adding of A and B
A-B	Gap between A and B
-A-B	Reverse of A+B
K-A-B	K = distance between sensors. Good for measuring thickness.
K+A+B	K = Offset value
K+A-B	K = Offset value
K+A	Offset the sensor A. K = Offset value
K+B	Offset the sensor B. K = Offset value

8 Banks selections

Bank No.	Bank 2 input	Bank 1 input	Bank 0 input
0	OFF	OFF	OFF
1	OFF	OFF	ON
2	OFF	ON	OFF
3	OFF	ON	ON
4	ON	OFF	OFF
5	ON	OFF	ON
6	ON	ON	OFF
7	ON	ON	ON

Electronic shutter

The microcomputer in the CD4 controller will automatically control the shutter speed depending upon the reflectance of the target.
This will select the best light intensity level for accurate measurement and will help to minimize the error (AUTO Sensitivity Mode).



Automatic control of light intensity will find the peak correctly.

RS-232C Communications

By connecting the CD4 controller to a PC, the following operations can be performed from the PC via RS232.
・Writing and reading out the setting value
・Reading out the measurement value
・Reading out the control output status
・Operating the control input
・Data buffer function

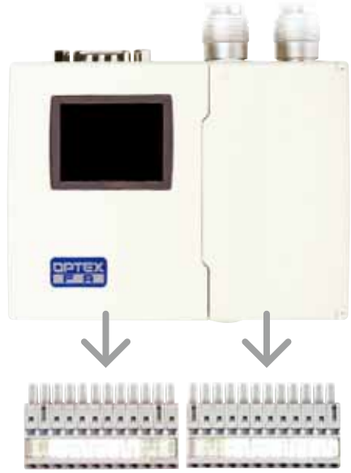
Communication method	RS-232C
Transmission type	Asynchronous
Baud rate	9600/19200/38400/115200 bps
Transmission code	ASCII
Data length	7/8 bit
Stop bit length	1 bit
Parity check	Nil/Ever number/Odd number
Data classification	STX・ETX

The underlined values are the factory default settings.

Adjust the communication settings of the PC and the CD4 using the values in the above table. The settings of the CD4 controller can be accessed in screen number 14 (RS232C).

Low / High pass filters

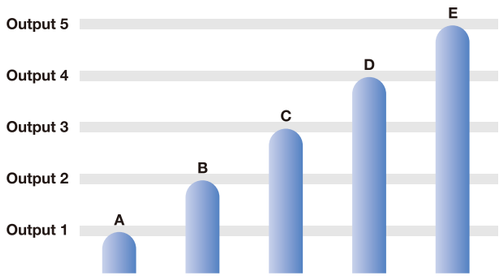
High / Low pass filters are built into the CD4 controller. A low pass filter will help to reduce any sudden changes in the measurement while the high pass filter will eliminate slow gradual changes.



Easy disconnection of QD type.

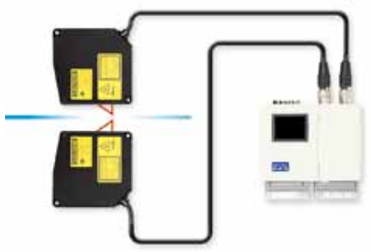
5 Independent outputs are available

This is convenient for sorting items according to size. Each of the 5 comparator outputs can be set independently, all outputs have a high and low threshold limit.



Two sensing heads can be controlled

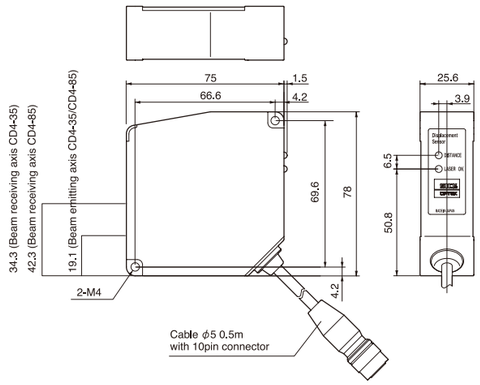
Therefore it computes for the purpose of measuring thickness, width, etc.
Independent measurement from each head is possible as well. Any combination of measurement heads (30, 85, 350) can be used together.



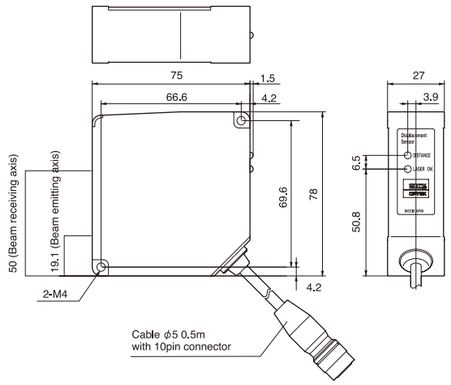
Dimensions

CD4 series sensor head

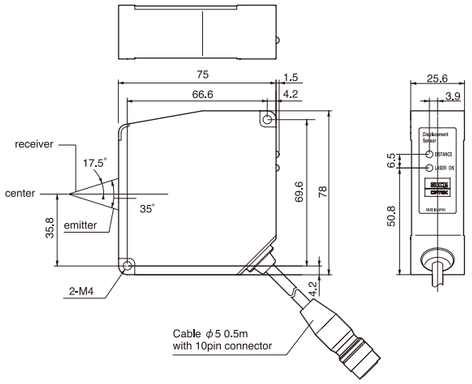
Model No. : CD4-30/-30-3R/-85/-85-3R



Model No. : CD4-350/-350-3R



CD4L-25 Sensor head

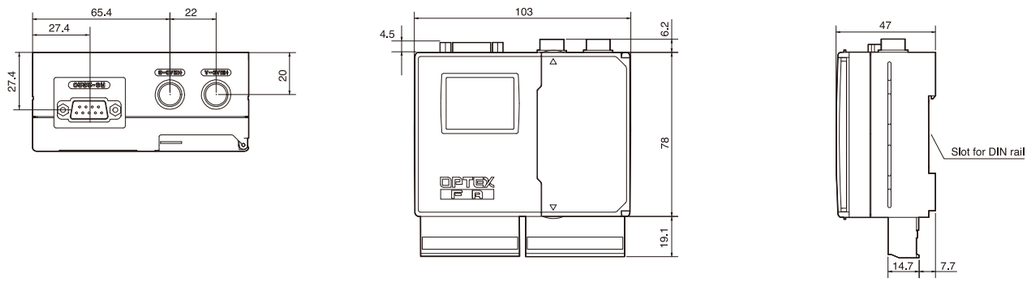


Cable

Model No. : CD4CN-S-ROBOT
: Extension 2m cable to connect the sensor head

Model No. : CD4CN-5S-ROBOT
: Extension 5m cable to connect the sensor head

Controller



(mm)

Specifications

CD4 series

Model	IEC Class 1 (FDA CLASS II) Type	CD4-30	CD4-85	CD4-350
	High power Class 3R Type	CD4-30-3R	CD4-85-3R	CD4-350-3R
Measurement range		30 ±5mm	85 ±20mm	350 ±100mm
Light source	(Regular type)	Class 2 (IEC / JIS) CLASS II (FDA) Red laser diode , 650nm, max 1m W		
	(High power type)	Class 3R (IEC / JIS) CLASS III a (FDA) Red laser diode, 650nm, max 5mW		
Spot size	(*1)	30×100μm	70×290μm	300×700μm
Linearity	(*2)	±0.1% F.S.		
Resolution	(*3)	1μm	3μm	40μm
Supply voltage		Supplied by CD4A-N / P controller		
Temp drift		±0.01% F.S. / ℃		
Laser emission indicator		Green = Laser emission		
Measurement indicator		Red = In range, closer than center 5% of measurement range (0 to 45%) Orange = Within ±5% of the center of the measuring range Green = In range, farther than center 5% of measurement range (55 to 100%) Red / Green alternating = Out of measuring range		
Protection category		IP67		
Operation temp / humidity		−10 to +45 ℃ (14 to 113 ℉), 35 to 85% RH		
Storage temp / humidity		−20 to +60 ℃ (−4 to 140 ℉), 35 to 85% RH		
Environmental illuminance		Incandescent lamp = Max 3,000 lux		
Vibration resistance		10 to 55 Hz double amplitude 1.5mm for XYZ		
Shock resistance		50G (500m/s²)		
Cable		50cm (19.7 inch) cable		
Cable extension		CD4CN-S-ROBOT (2m, 78 inch), CD4CN-5S-ROBOT (5m, 197 inch)		
Material		Aluminum diecast		

*1 Defined with center strength 1/e² (13.5%). There may be leak light other than the spot size. The sensor may be affected when there is a highly reflective object close to the detection area.
*2 256 times in average (using the special amplifier), object: White ceramic. The value is subject to objects.
*3 The typical value in the conditions of 256 times in average (using the special amplifier), object: White ceramic, distance range: Middle. The value is subject to objects.

CD4L-25

Model	CD4L-25
Measurement range	25 ±1mm
Light source	Class 1 (IEC / JIS) CLASS II (FDA) Laser, 650nm, max 390 μW
Spot size (*1)	25×35 μm
Linearity (*2)	± 0.1% F.S.
Resolution (*3)	0.1 μm
Supply voltage	Supplied by CD4A-LN/LP controller
Temp drift	±0.01% F.S. / ℃
Laser emission indicator	Green = Laser emission
Measurement indicator	Red = In range, closer than center 5% of measurement range (0 to 45%) Orange = Within ±5% of the center of the measuring range Green = In range, farther than center 5% of measurement range (55 to 100%) Red / Green alternating = Out of measuring range
Protection category	IP67
Operation temp / humidity	−10 to +45 ℃ (14 to 113 ℉), 35 to 85% RH
Storage temp / humidity	−20 to +60 ℃ (−4 to 140 ℉), 35 to 85% RH
Environmental illuminance	Incandescent lamp = Max 3,000 lux
Vibration resistance	10 to 55 Hz double amplitude 1.5mm for XYZ
Shock resistance	50G (500m/S²)
Cable	50cm (19.7 inch) cable
Cable extension	CD4CN-S-ROBOT (2m, 78 inch), CD4CN-5S-ROBOT (5m, 197 inch)
Material	Aluminum diecast

*1 Defined with center strength 1/e² (13.5%). There may be leak light other than the spot size. The sensor may be affected when there is a highly reflective object close to the detection area.
*2 256 times in average (using the special amplifier), object: evaporated aluminum mirror. The value is subject to objects.
*3 The typical value in the conditions of 256 times in average (using the special amplifier), object: White ceramic, distance range: Middle. The value is subject to objects.

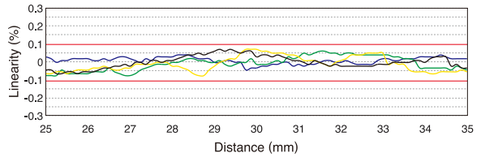
Controller

Model		CD4A-N / -LN (NPN output type)	CD4A-P / -LP (PNP output type)
Number of heads		Max.2 pcs	
Sampling period		100μs	
Supply voltage		12 - 24VDC ±10%	
Power consumption		270mA / 24VDC (When connected with 2 sensor heads. Including analog current output)	
Temp drift		±0.01% F.S. / ˚C	
Analog output	**ANG** (V) [A] [B]	Voltage output ±5V / F.S. (Output impedance 100Ω, resolution 1mV)	
	ANG (mA) [A] [B]	Current output 4 to 20mA / F.S. (Load impedance 300Ω, resolution 1.5μA)	
Alarm output	**ALM A,ALM B**	NPN open collector	PNP open collector
		Max. 100mA / 24VDC (residual voltage Max. 1.8V) Turns ON when the sensor head fails in measurement.	
Control output	**JDGE 1 to 5**	NPN open collector	PNP open collector
		Max. 100mA / 24VDC (residual voltage Max. 1.8V)	
		HI / LO setting and Hysteresis setting are available for each output.	
Bank input	**BANK 0 to 2**	ON when connected to GND	ON when connected to 12 - 24VDC
		8 banks selectable	
Hold input	**HOLD A, HOLD B,**	ON when connected to GND	ON when connected to 12 - 24VDC
	HOLD RST	Laser off or measurement value holding (selectable in the menu)	
Zero reset input	**ZERO A, ZERO B**	ON when connected to GND	ON when connected to 12 - 24VDC
		Zero reset of head A measurement value / Head B measurement value / Calculation value is available.	
Optional features		Average sampling times, Filter mode (Cut-off frequency), Calculation, Hold setting, Output during alarm, Output control (Hysteresis), Analog output, Sensor head sensitivity control, Timer function, Memory function, Memory bank function, Auto zero reset	
Display type		LCD display	
Protection category		IP20	
Operation temp / humidity		−10 to +45˚C (Non-condensing) / 35 to 85% RH	
Storange temp / humidity		−20 to +60˚C / 35 to 85% RH	
Vibration resistance		10 to 55Hz, Double amplitude 1.5mm, 2h for XYZ axis	
Shock resistance		20G (196m/s²)	
Material		Chassis: Polycarbonate, Connection terminals: Nylon 66	
Weight		240g (including connection terminals)	

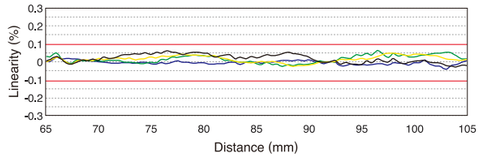
Linearity (Typical example data)

CD4 series : by material

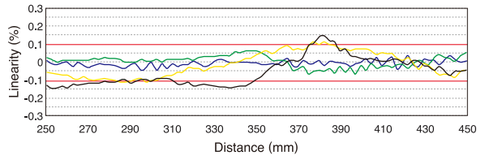
Model No. : CD4-30 / CD4-30-3R

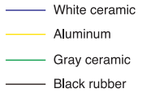


Model No. : CD4-85 / CD4-85-3R

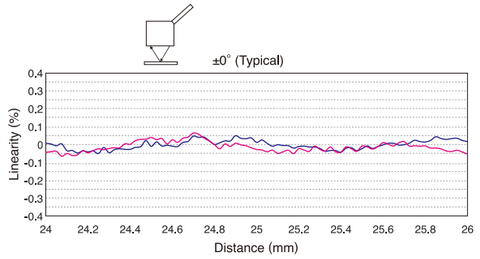


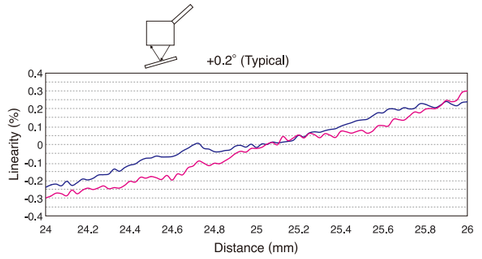
Model No. : CD4-350 / CD4-350-3R

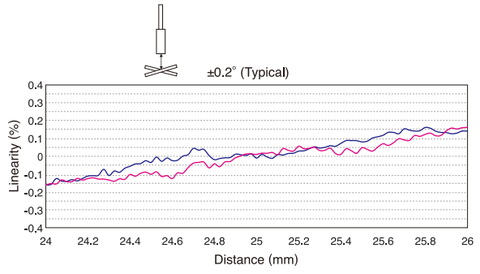


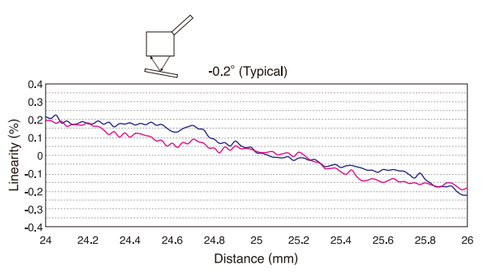


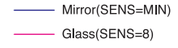
CD4L-25 : by angle







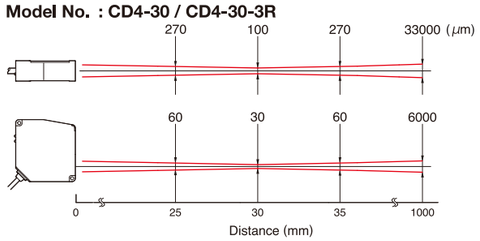




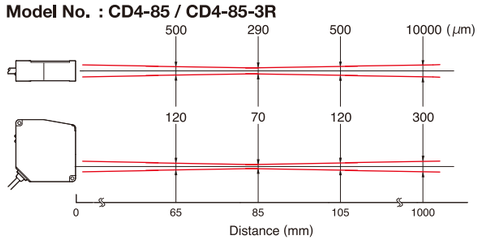
Spot size

CD4 series

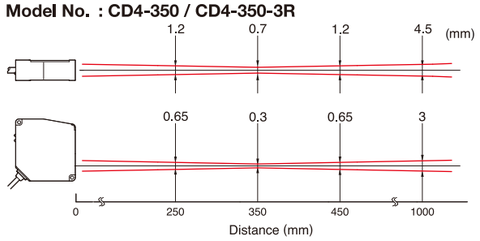
Model No. : CD4-30 / CD4-30-3R



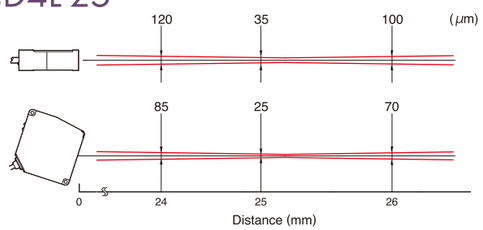
Model No. : CD4-85 / CD4-85-3R



Model No. : CD4-350 / CD4-350-3R



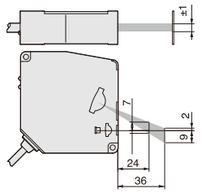
CD4L-25



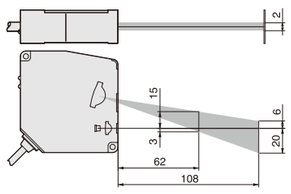
Interference area

CD4 series

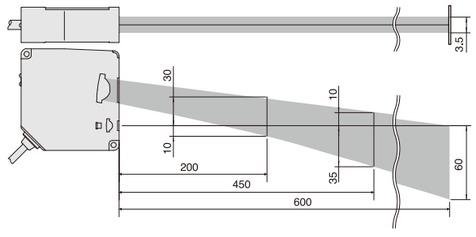
Model No. : CD4-30/CD4-30-3R



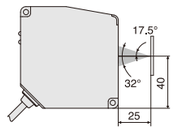
Model No. : CD4-85/CD4-85-3R



Model No. : CD4-350/CD4-350-3R



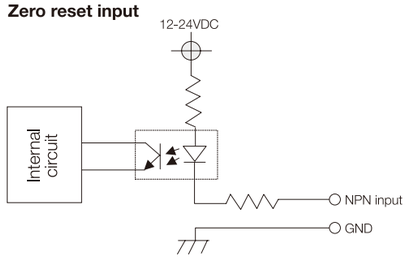
CD4L-25



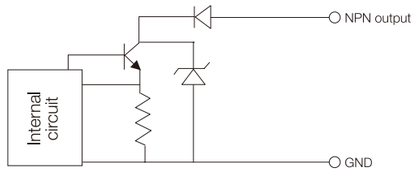
(mm)

Input / Output diagrams

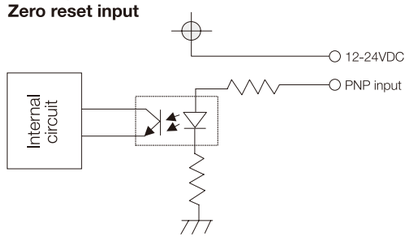
NPN model bank input
Hold input
Zero reset input



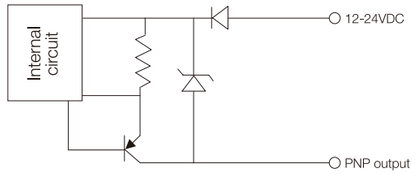
NPN model
control output
Alarm output



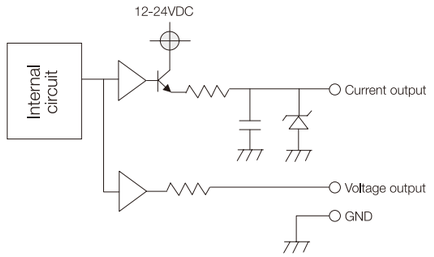
PNP model bank input
Hold input
Zero reset input



NPN model
control output
Alarm output



Analog output (A/B)



CD33 series

CMOS sensor with ±0.1% F.S. linearity packed in a half-palm size, ideal for built-in use with OEM machines.

- Available is CD33-L a Specular Types for high reflection and transparent object even in RS422 serial communications.
- Just connect UQ1-02 to build data logging system to Mitsubishi PLC without any I/F, logging unit and ladder program.
- Analogue output (4-20mA or 0-10V) + 2 control outputs
  Stand-alone design capable of direct operation without controller

LINEUP

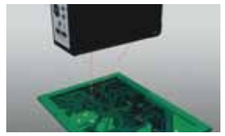
Diffuse type

CD33-30

30mm distance type

Warping / Sagging of PC board

Measurement range : 30 ±4mm
Resolution : 4μm (Fast mode)
Linearity : ±0.1% F.S.



CD33-50

50mm distance type

Height of components on the board

Measurement range : 50 ±10mm
Resolution : 8μm (Fast mode)
Linearity : ±0.1% F.S.

CD33-85

85mm distance type

Joint of rubber sheet

Measurement range : 85 ±20mm
Resolution : 15μm (Fast mode)
Linearity : ±0.1% F.S.

CD33-120

120mm distance type

Loosen rubber sheet

Measurement range : 120 ±60mm
Resolution : 45μm (Fast mode)
Linearity : ±0.1% F.S.

CD33-250

250mm distance type

Checking tire

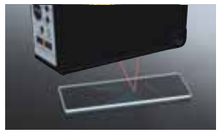
Measurement range : 250 ±150mm
Resolution : 100μm (Fast mode)
Linearity : ±0.3% F.S.

Specular type

CD33-L30

26.3mm distance type

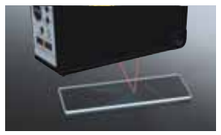
Measurement range : 26.3 ±2mm
Resolution : 1 μm
Linearity : ±0.2% F.S.



CD33-L50

47.3mm distance type

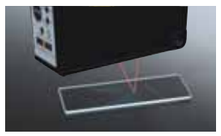
Measurement range : 47.3 ±5mm
Resolution : 2.5 μm
Linearity : ±0.2% F.S.



CD33-L85

82.9mm distance type

Measurement range : 82.9 ±10mm
Resolution : 5 μm
Linearity : ±0.2% F.S.



Application example for specular type
Measurement of glass thickness is available

Product code

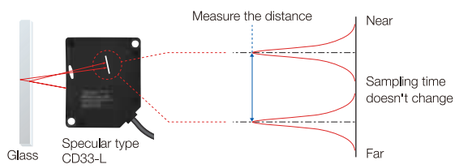
- CD33-□□**NV** (N=NPN, V=0-10V)
- CD33-□□**PV** (P=PNP, V=0-10V)
- CD33-□□**NA** (N=NPN, A=4-20mA)
- CD33-□□**PA** (P=PNP, A=4-20mA)
- CD33-□□□**N**-422 (N=NPN, 422=RS422 I/F)
- CD33-□□□**P**-422 (P=PNP, 422=RS422 I/F)

CD33 ADVANCED TECHNOLOGY

The CD33 series is a function rich CMOS laser displacement sensor designed in an ultra-compact housing RS-422 type is available for digital connection

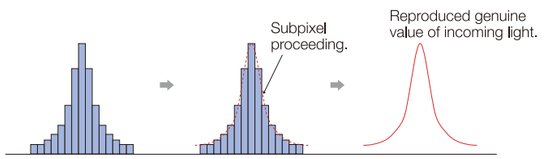
Reliable glass thickness measurement

The Specular type CD33-L** can detect both surface of glass and measure the thickness.



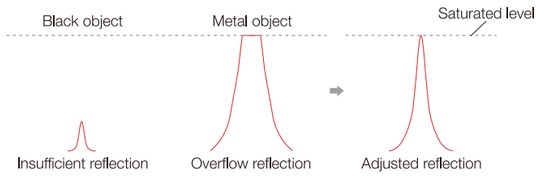
Digital subpixel processing

Subpixel processing divides one pixel into small pieces that enables accurate measurement by reproducing genuine value of incoming light.



High resolution electronic shutter

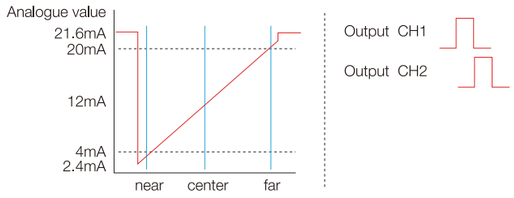
High resolution electronic shutter controls to keeps a constant level according to reflection.
This function enables stable peak level detection even when unstable surface conditions exist.



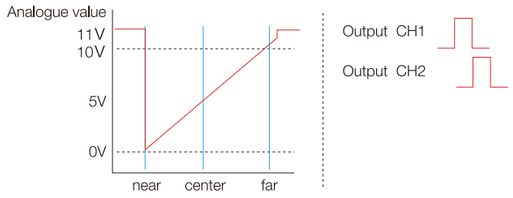
Easy-to-select models between voltage and current output.

It is common today for sensors to be very complicated requiring long set-up times and many buttons to operate. The CD33 focuses on easier set-up by separating voltage and current output models into two types.

4-20mA output + 2CH outputs



0-10V output + 2CH outputs



Ideal for robot mounting

Ideal for mounting on robot cylinder thanks to compact dimensions and the light 65g weight. IP67 water tightness is also secured.

Control unit UQ1 series to connect sensor head to PLC MELSEC-Q series directly

UQ1-02 enables easy connection of CD33 and PLC MELSEC-Q series. UQ1 setup the sensor head automatically.You don't have to have big ladder proglam.

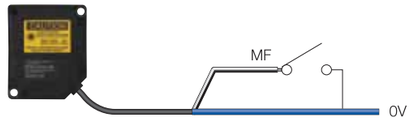
→P313

2CH outputs enables individual setting of measurement range.

Highly accurate comparator output capable of identifying 12μm (with CD33-30 types). Hysteresis is just 0.15% F.S.

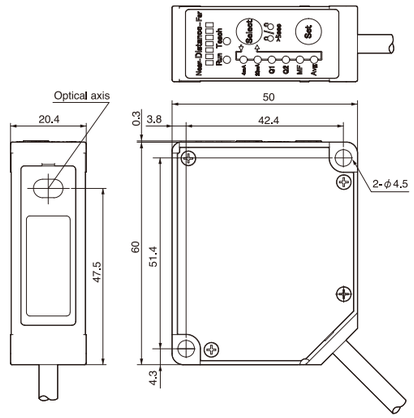
MF (Multi Function) input for further convenience.

The programmable remote MF input can be set to one of the following: Laser o , External teach, Hold, or One-shot trigger.

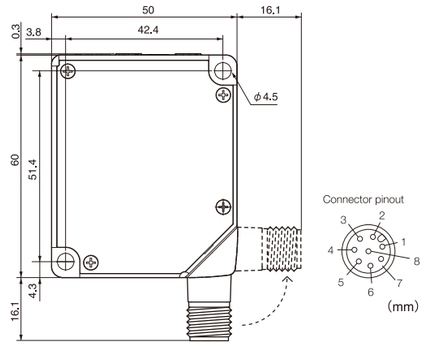


Dimensions

Cable type

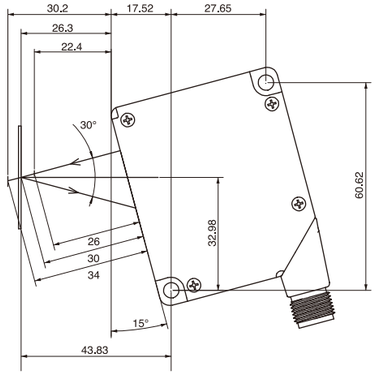


M12 Connector type

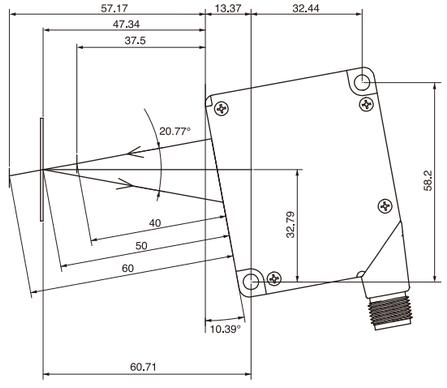


Mounting of specular type

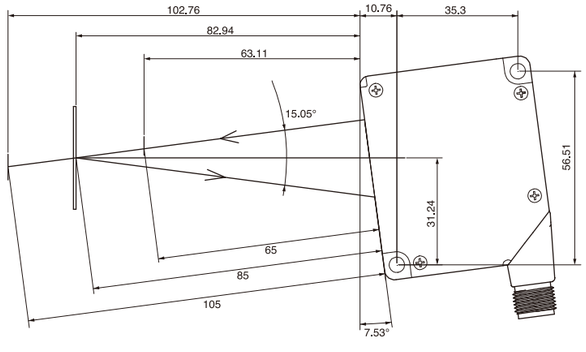
Model No. : CD33-L30



Model No. : CD33-L50



Model No. : CD33-L85

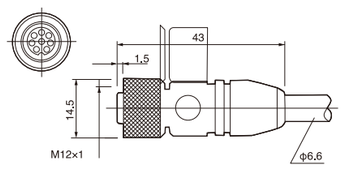


Accessories

Cable

Model No. : DOL-1208-G02MF
: 2m extension cable (unbundled)

Model No. : DOL-1208-G05MF
: 5m extension cable (unbundled)



Specifications

Diffuse type

Model	Cable type	2control output	CD33-30N / P	CD33-50N / P	CD33-85N / P	CD33-120N / P	CD33-250N / P
		2control output + Analog 4-20mA	CD33-30NA / PA	CD33-50NA / PA	CD33-85NA / PA	CD33-120NA / PA	CD33-250NA / PA
		2control output + Analog 0-10V	CD33-30NV / PV	CD33-50NV / PV	CD33-85NV / PV	CD33-120NV / PV	CD33-250NV / PV
		1control output + RS422	CD33-30N-422 CD33-30P-422	CD33-50N-422 CD33-50P-422	CD33-85N-422 CD33-85P-422	CD33-120N-422 CD33-120P-422	CD33-250N-422 CD33-250P-422
	Connector type	2control output	CD33-30CN / CP	CD33-50CN / CP	CD33-85CN / CP	CD33-120CN / CP	CD33-250CN / CP
		2control output + Analog 4-20mA	CD33-30CNA / CPA	CD33-50CNA / CPA	CD33-85CNA / CPA	CD33-120CNA / CPA	CD33-250CNA / CPA
		2control output + Analog 0-10V	CD33-30CNV / CPV	CD33-50CNV / CPV	CD33-85CNV / CPV	CD33-120CNV / CPV	CD33-250CNV / CPV
		1control output + RS422	CD33-30CN-422 CD33-30CP-422	CD33-50CN-422 CD33-50CP-422	CD33-85CN-422 CD33-85CP-422	CD33-120CN-422 CD33-120CP-422	CD33-250CN-422 CD33-250CP-422
Control output			N = NPN output, P = PNP output				
Measurement range			30±4mm	50±10mm	85±20mm	120±60mm	250±150mm
Full scale			8mm	20mm	40mm	120mm	300mm
Light source			Red laser diode (wave length 655nm)				
Peak power			1mW max.				
IEC/JIS Class			Class 2				
FDA CLASS			CLASS II				
Spot size (approx.volume) (*1)	**Near**		0.15×0.15mm	0.6×1.2mm	0.9×1.5mm	1.2×1.8mm	1.5×2.5mm
	Middle		0.1×0.1mm	0.5×1.0mm	0.75×1.25mm	1.0×1.5mm	1.75×3.5mm
	Far		0.15×0.15mm	0.4×0.9mm	0.6×1.0mm	0.5×0.8mm	2.0×4.5mm
Linearity (*2)			±0.1% F.S.				±0.3% F.S.
Resolution(*3)	**Fast**		4μm	8μm	15μm	45μm	100μm
	Other		2μm	5μm	10μm	30μm	75μm
Temp drift			±0.08%F.S. / ˚C				
Response time (*4)	**Fast**		1ms+ selecting sensitivity (averaging : 1)				1.5ms+ selecting sensitivity (averaging : 1)
	Standard		8.5ms+ selecting sensitivity (averaging : 16)				13ms+ selecting sensitivity (averaging : 16)
	High resolution		32.5ms+ selecting sensitivity (averaging : 64)				49ms+ selecting sensitivity (averaging : 64)
	Selecting sensitivity		4ms max.				
Indicators	**Distance indicator**		bar graph LED				
	Output indicator		ON status : Orange				
Protection category			IP67				
Operating temp / humidity			−10～+45˚C / 35～85%RH (No condensation or freezing)				
Storage temp / humidity			−20～+60˚C / 35～95%RH (No condensation or freezing)				
Ambient illuminance			Sun light : 10,000lx max. Incandescent lamp : 3,000lx max.				
Vibration resistance			10 to 55 Hz, Double amplitude 1.5 mm, 2 h for XYZ axis				
Shock resistance			50G (500m/s²)				
Cable extension			Up to 10m using an optional extension cable				
Material			PBT (Case) PMMA (Front window)				
Weight	**Cable type**		approx.65g (without cable)				
	Connector type		approx.70g				

Model		2 Control output	+ Analog 4-20mA	+ Analog 0-10V	1 Control output + RS422
Supply voltage		12 - 24VDC (-5%, +10%)		18 - 24VDC (-5%, +10%)	12 - 24VDC (-5%, +10%)
Current consumption		max. 55mA (24VDC)	max. 85mA (24VDC)	max. 55mA (24VDC)	
Output	**Control output 1**	NPN / PNP open collector 100mA max. / 30VDC (residual voltage max. 1.8V)			—
	Control output 2	NPN / PNP open collector 100mA max. / 30VDC (residual voltage max. 1.8V)			
	Analog output	—	4-20mA	0-10V	—
Interface		—			RS422
Cable type		Dia : 5mm 5core 2m AWG24 (PVC)	Dia : 5mm 6core 2m AWG24 (PVC)		Dia : 5mm 8core 2m AWG24 (PVC)
Connector type		M12 8pin			

*1 Defined with center strength $1/e^2$(13.5%). There may be leak light other than the specified spot size. The sensor may be affected when there is a highly reflective object around the targets.
*2 Averaging : 64(High resolution), Object : white ceramic.
*3 Middle of measuring range, Object : white ceramic.
*4 Response time : response time plus selecting sensitivity time.

Specular type

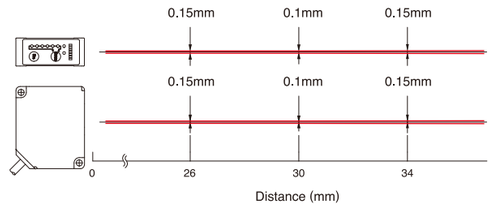
Model	Cable type				
		2control output + Analog 4-20mA	CD33-L30NA / PA	CD33-L50NA / PA	CD33-L85NA / PA
		2control output + Analog 0-10V	CD33-L30NV / PV	CD33-L50NV / PV	CD33-L85NV / PV
		1control output + RS422	CD33-L30N-422 / P-422	CD33-L50N-422 / P-422	CD33-L85N-422 / P-422
	Connector type	2control output + Analog 4-20mA	CD33-L30CNA / CPA	CD33-L50CNA / CPA	CD33-L85CNA / CPA
		2control output + Analog 0-10V	CD33-L30CNV / CPV	CD33-L50CNV / CPV	CD33-L85CNV / CPV
		1control output + RS422	CD33-L30CN-422 / CP-422	CD33-L50CN-422 / CP-422	CD33-L85CN-422 / CP-422

Control output		N = NPN open collector, P = PNP open collector		
Measurement range		26.3±2mm	47.3±5mm	82.9±10mm
Full scale		4mm	10mm	20mm
Light source		Red laser diode, 655nm		
Peak power		390μW max.		
IEC/JIS Class		Class 1		
FDA CLASS		CLASS II		
Spot size (approx.volume) (*1)	**Near**	0.15×0.15mm		
	Middle	0.1×0.1mm		
	Far	0.15×0.15mm		
Linearity (*2)		±0.2% F.S.		
Resolution(*3)		1μm	2.5μm	5μm
Temp drift		±0.08%F.S. / ℃		
Response time (*4)	**Fast**	1ms+ selecting sensitivity (averaging : 1)		
	Standard	8.5ms+ selecting sensitivity (averaging : 16)		
	High resolution	32.5ms+ selecting sensitivity (averaging : 64)		
	Selecting sensitivity	4ms max.		
Indicators	**Distance indicator**	bar graph LED		
	Output indicator	ON status : Orange		
Protection category		IP67		
Operating temp / humidity		−10～+45℃ / 35～85%RH (without condensing)		
Storage temp / humidity		−20～+60℃ / 35～95%RH (without condensing)		
Ambient illuminance		Incandescent lamp : 3,000lx max.		
Vibration resistance		10 to 55 Hz, Double amplitude 1.5 mm, 2 h for XYZ axis		
Shock resistance		50G (500m/s²) XYZ 3times		
Cable extension		Up to 10m using an optional extension cable		
Material		PBT (Case) PMMA (Front window)		
Weight	**Cable type**	approx.65g (without cable)		
	Connector type	approx.70g		

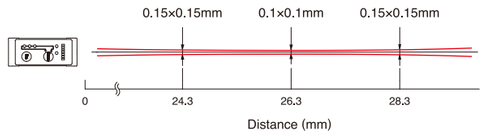
*1 Defined with center strength 1/e²(13.5%). There may be leak light other than the specified spot size. The sensor may be affected when there is a highly reflective object around the targets.
*2 Averaging : 64(High resolution), Object : evaporated aluminum mirror.
*3 Middle of measuring range, Object : evaporated aluminum mirror.
*4 Response time : response time plus selecting sensitivity time.

Spot size

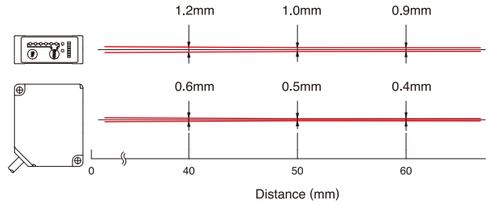
Model No. : CD33-30N□



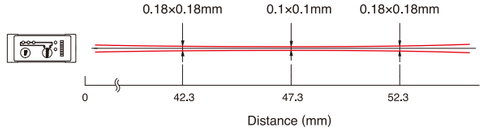
Model No. : CD33-L30N-422



Model No. : CD33-50N□



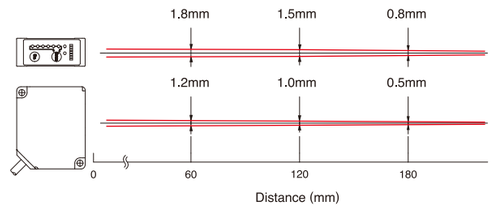
Model No. : CD33-L50N-422



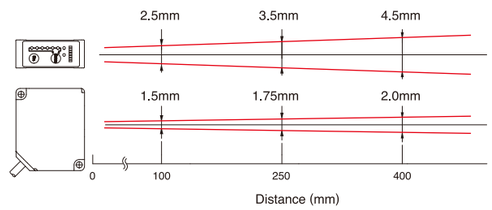
Model No. : CD33-85N□

Model No. : CD33-L85N-422

Model No. : CD33-120N□

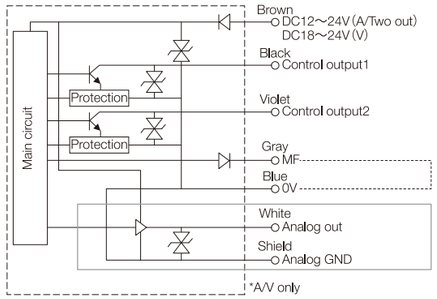


Model No. : CD33-250N□

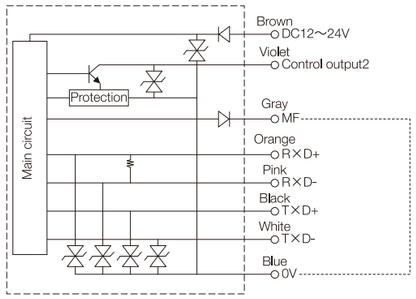


Input / Output diagrams

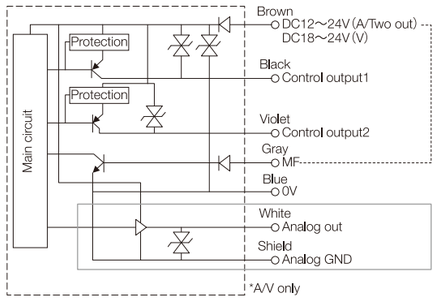
NPN type (Analogue / Voltage dual)



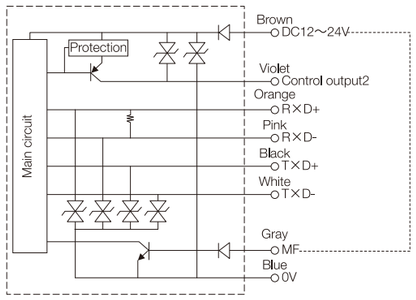
NPN type (RS422)



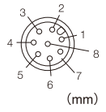
PNP type (Analogue / Voltage dual)



PNP type (RS422)



Connector pinout



(mm)

CD3 series

- CMOS Image sensor for high accuracy displacement laser.
- Span adjustment and offset functions for flexible control of analogue output.
- Preset alarm for Peak / Bottom limit of analogue value.
- Accurate detection of dark colored targets.

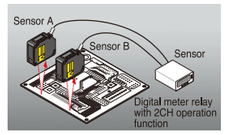
LINEUP

CD3-30

30mm type

Warp detection of PC board

Measurement range : 30 ±4mm
Resolution : 2㎛ (When averaging of 256 times)
Linearity : ±1% F.S.

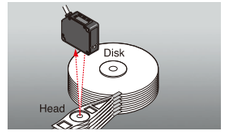


CD3-50

50mm type

Warp detection of HDD assy and actuator

Measurement range : 50 ±10mm
Resolution : 8㎛ (When averaging of 256 times)
Linearity : ±1% F.S.

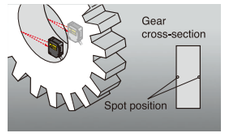


CD3-80

80mm type

Interior diameter of gear

Measurement range : 80 ±15mm
Resolution : 8㎛ (When averaging of 256 times)
Linearity : ±1% F.S.

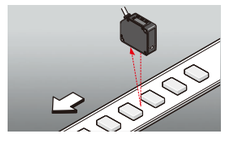


CD3-100

100mm type

Measurement of product thickness

Measurement range : 100 ±40mm
Resolution : 30㎛ (When averaging of 256 time)
Linearity : ±1% F.S.



CD3-250

250mm type

Monitoring die cast

Measurement range : 250 ±150mm
Resolution : 100㎛ (When averaging of 256 time)
Linearity : ±1.5% F.S. (100 to 250mm)
±2.5% F.S. (251 to 400mm)

CD3 ADVANCED TECHNOLOGY

Simple pushbutton teach, and easy-to-view digital panel.

Simple pushbutton teach, and easy-to-view digital panel.

stability indicator

Green — Stable operation
Dark — Unstable operation
Red — No operation due to low light or too much light

distance indicator

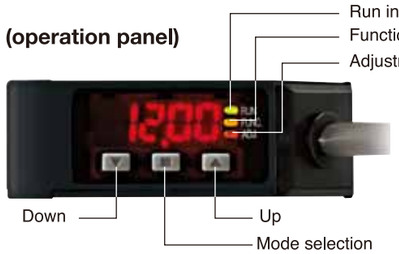
Actual distance between sensor and object as below.

green / red blinking	Out of range
red	Near limit
orange	±5% of reference distance
green	Far limit
red / green blinking	Out of range

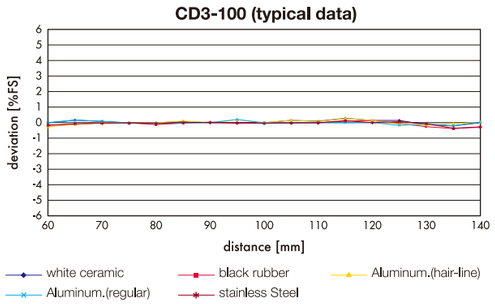
Remarks : The border between the near / far limit and out of range depends upon the sensor model.

output indicator

(operation panel)



Stable measurement of both highly reflective polished surfaces as well as non reflective material such as black rubber.



Voltage output coverter CV-15

If you need to convert 4-20mA analogue output into 1-5V voltage output connect the resistor CV-15.

Digital Meter, etc

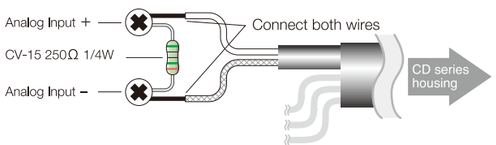
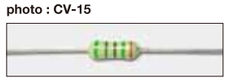
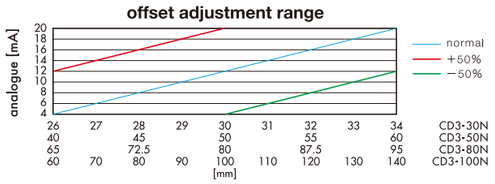


photo : CV-15



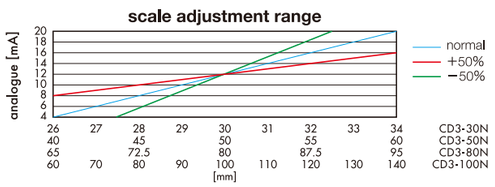
Offset

The Offset Function shifts the analog output value in either the positive or the negative direction. This is adjustable within ±50% of the rated distance of the sensor.



Span adjustment

Span adjustment changes the proportion of output value (displacement) to the distance. This is available within ±50% against rated value.

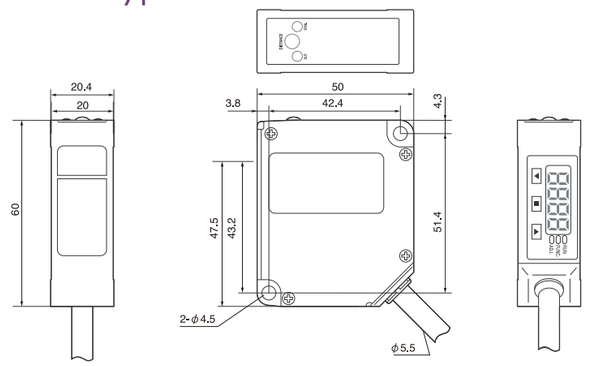


Analogue restraint function

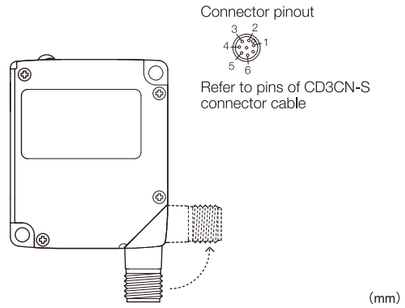
In case analogue value overflows the limit, you can choose ; CLP mode = Analogue value remains 24mA for any overflowing value.
HOLD mode = Analogue value is held at the last value before overflow.

Dimensions

Cable type



M12 Connector type



(mm)

Specifications

Model	Cable	CD3-30N / P	CD3-50N / P	CD3-80N / P	CD3-100N / P	CD3-250N / P
	M12 Connector	CD3-30CN / CP	CD3-50CN / CP	CD3-80CN / CP	CD3-100CN / CP	CD3-250CN / P
Transistor output		N = NPN output, P = PNP output				
Measurement range		30 ±4mm	50 ±10mm	80 ±15mm	100 ±40mm	250 ±150mm
Full scale		8mm	20mm	30mm	80mm	300mm
Light source		Class 2 Laser, 650nm, max 1mW				
Min spot size		ϕ0.5 mm	ϕ0.8 mm	1×1.5mm	1×1.5mm	3×1.5mm
Supply voltage		12 - 24VDC (−5 to +10%)				
Sensitivity adjustment		Nominal value 1-20, or AUTO				
Power consumption		Max 120mA (12VDC), 80mA (24VDC), including analog output current				
Resolution (typical value)		(Unit : Micron. Under AUTO sensitivity. White ceramic as an object)				
(Averaging 64: default value)		4	10	10	30	150
(Averaging 1)		12	30	40	80	2000
(Averaging 4)		8	20	30	60	800
(Averaging 16)		6	12	20	40	400
(Averaging 256)		2	8	8	20	100
(Averaging 1024)		below 2	below 8	below 8	below 10	50
Linearity		±1% F.S.				±1.5%F.S. (up to 250mm) ±2.5%F.S. (up to 400mm)
Temp drift		±0.08% F.S. / Celsius				
Response time		Max 2.2ms (at fixed sensitivity between 1-20),Max 15ms (at auto sensitivity)				
Sampling rate		500μs				
Analogue output		4-20 mA				
Control output		NPN or PNP, Max 100mA/24VDC, Residual voltage max 1.8V				
Timer		On delay / Off delay / Oneshot (1msec increment for 0-999ms, 1sec for 0-10 sec)				
Distance indicator		Red = Near, Orange = Middle, Green = Far, Red / Green = Error *Remark : Errors as "out of measuring range", "Too high reflection", etc				
Stability indicator		Green = Stable, Red = Error, No light = Unstable, need adjustment				
Control output indicator		Orange = Output (NPN or PNP)				
Environmental illuminance		Sun light : Max 10,000 lux, Incandescent Lamp = Max 3,000 lux				
Operating temp / humidity		−10 to +40°C, 35 to 95% RH				
Insulation resistance		20 MΩ / 500VDC				
Material		Zinc diecast				
Protection category		IP67				
Conformity		CE				
Warm-up time		30 minutes				
Weight		Approx.130g (Without cable)				

CD22 series

High performance cost effective self contained displacement sensor in an innovative compact housing.

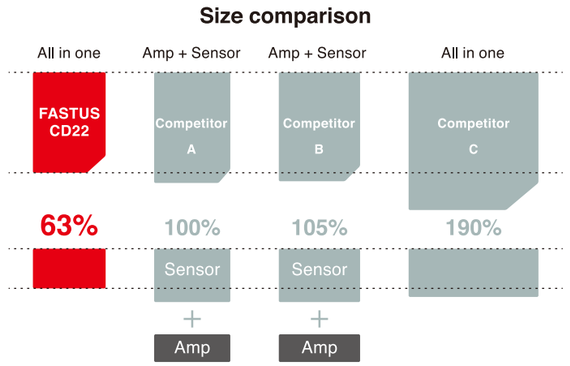
- One of the World's Smallest Displacement Sensors!!
- Innovative size! Fits in any machine.
- Perfomance like High end.
- Repeatability 1μm. (CD22-15□□)

Lineup

Type	Measurement range	Repeatability	Analog output, Serial I/F	Lineup	
				Aluminum housing	SUS housing
Diffuse reflective	10 15 20 — 15±5㎜	1μm	4~20mA	CD22-15A□	CD22M-15A□
			0~10V	CD22-15V□	CD22M-15V□
			RS-485	CD22-15-485□	CD22M-15-485□
	20 35 50 — 35±15㎜	6μm	4~20mA	CD22-35A□	CD22M-35A□
			0~10V	CD22-35V□	CD22M-35V□
			RS-485	CD22-35-485□	CD22M-35-485□
	50 100 — 100±50㎜ — 150	20μm	4~20mA	CD22-100A□	CD22M-100A□
			0~10V	CD22-100V□	CD22M-100V□
			RS-485	CD22-100-485□	CD22M-100-485□

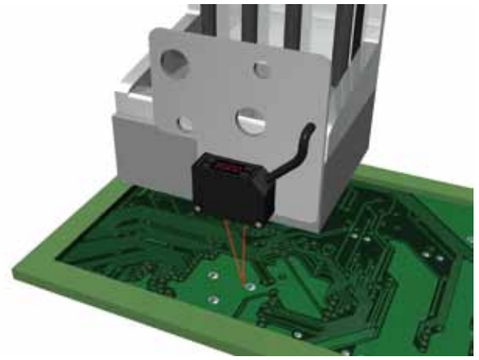
One of the world's smallest displacement sensors

This is enabled by:
- Dedicated hybrid lens
- Original all in one technology
- High quality feedback circuitry



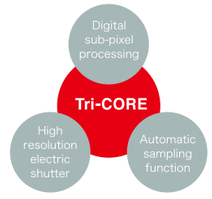
Ideal for robot mounting

Installing into machinery is the most suitable appication.
- Small and light weight
- Small temperatue drift
- All in one



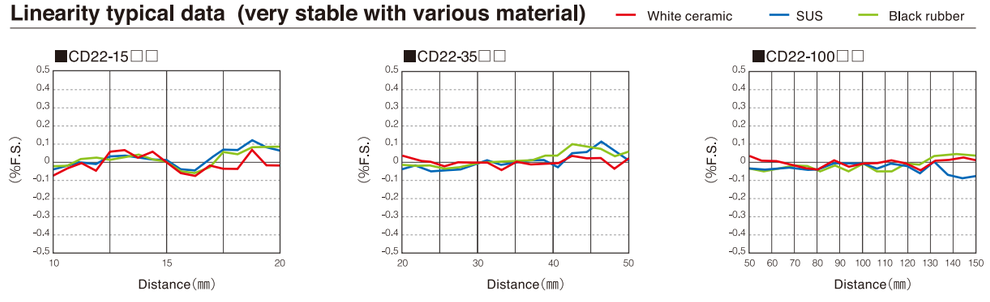
High Accuracy enabled by "Tri-CORE":

- Digital sub-pixel processing
- High resolution electric shutter
- Automatic sampling function



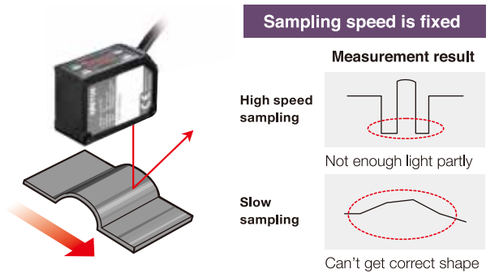
Repeatability : 1μm (CD22-15□□) | Linearity : ±0.1% F.S.

Linearity typical data (very stable with various material)



Automatic sampling function

In addition to standard feedback, received light to laser power, CD22 has Automatic sampling function which enables stable measurement of metal surface and also black material by adjusting sampling speed.

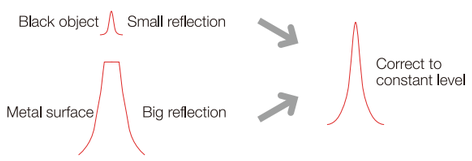


Easy to see digital panel

- 4 Digit display in small housing
- Easy setup by 4 buttons
- Functions are like high-end

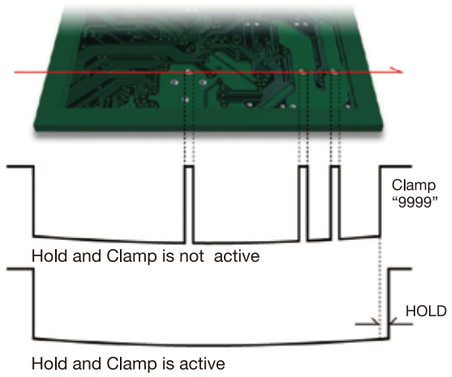
High resolution electric shutter
Automatic level correction

A high resolution electric shutter that can be controlled to 1/485th of the sampling period helps to insure stable peak level detection even when unstable surface conditions exist.



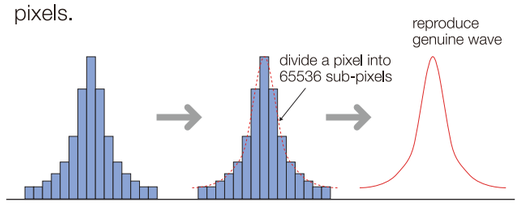
Alarm - Hold and Clamp

CD22 can neglect small holes on the PWB by "Hold and Clamp" function.
This is good for detecting objects with rough surface.



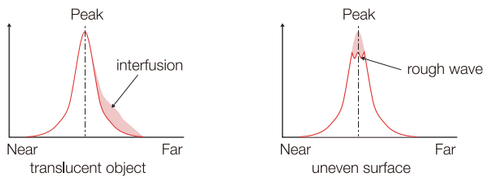
Digital sub-pixel processing
Accurate profile reproduction

The linearity has been improved to more than twice that of a conventional product by digital sub-pixel processing. This divides one pixel into 65536 sub-pixels.



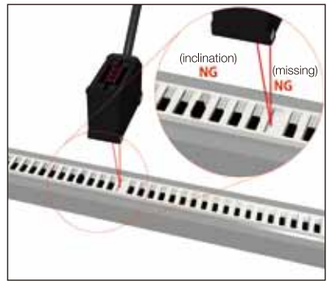
Original algorithm
For uneven and varied luster object

Even if the object is translucent or its surface is uneven, it can detect the position of the true peak thanks to the original OPTEX FA designed algorithm.

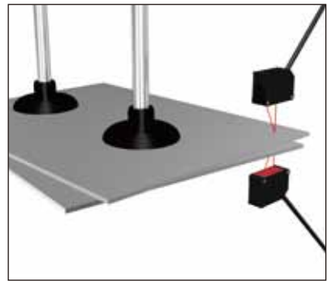


Applications

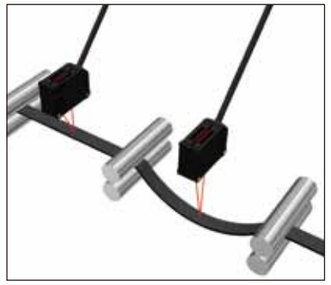
Detecting small parts in a nest



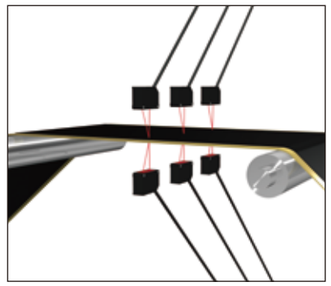
Detection of thin double sheets



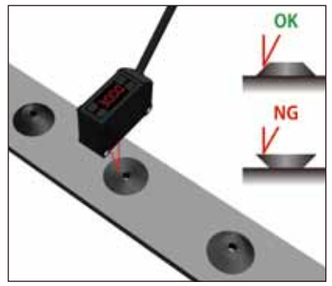
Loop control of rubber extrusion



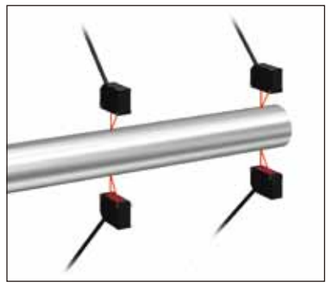
Measuring thickness of thin film electrode



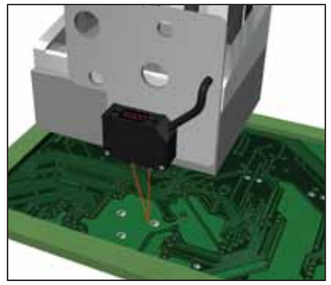
Checking face of black rubber parts



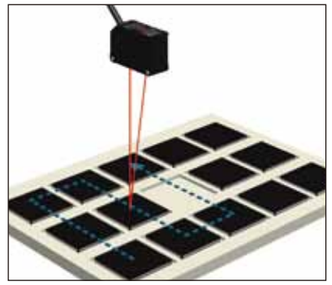
Measuring deviation of shaft axis



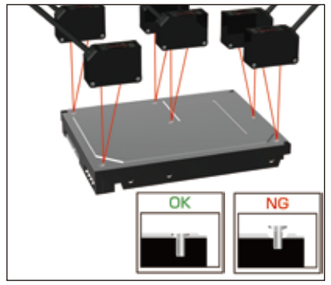
Measuring flatness of PWB



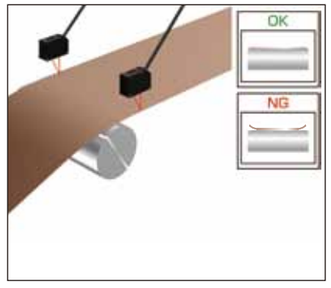
Detecting existence of thin parts on the tray



Measuring height of screw tightened

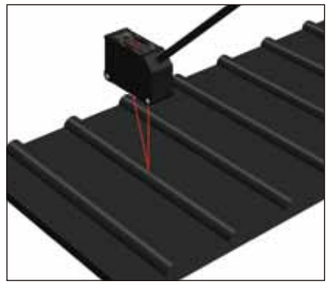


Detecting edge of metal foil rises on the roller



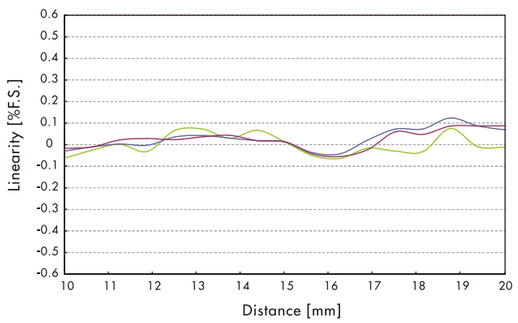
Measuring flatness of metal plate

Checking thickness and shape of black rubber

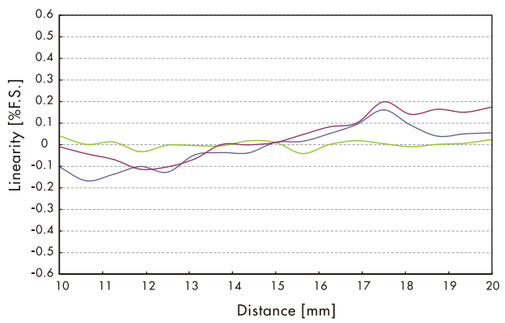


Linearity (Typical example data)

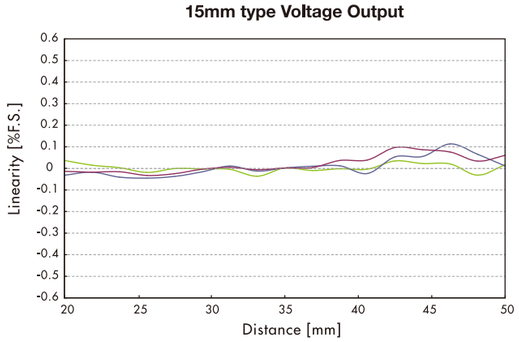
White ceramic — Stainless steel — Black rubber



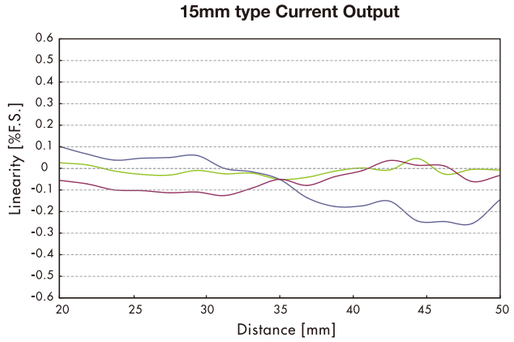
15mm type Voltage Output



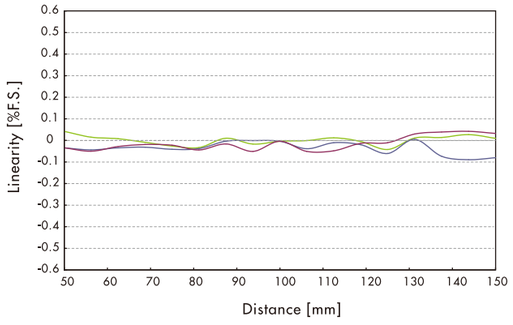
15mm type Current Output



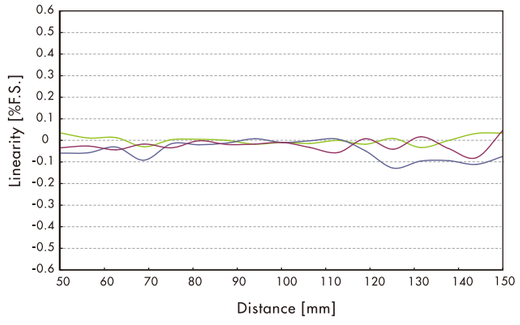
35mm type Voltage Output



35mm type Current Output



100mm type Voltage Output

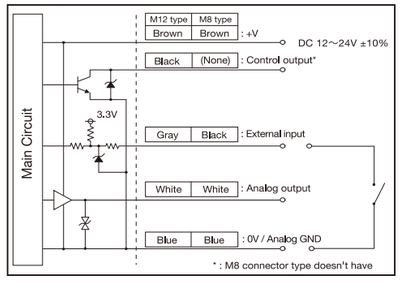


100mm type Current Output

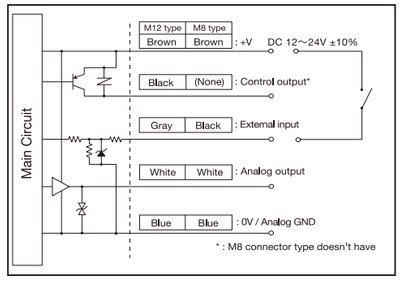
Circuit diagram

Input and output are "NPN type" or "PNP type" selectable by setting.

NPN type

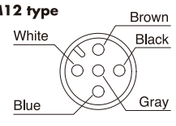


PNP type

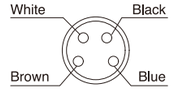


Pin configuration
(sensor side)

M12 type

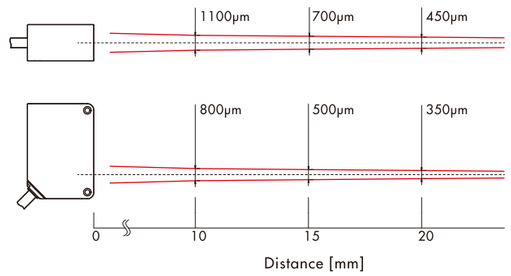


M8 type

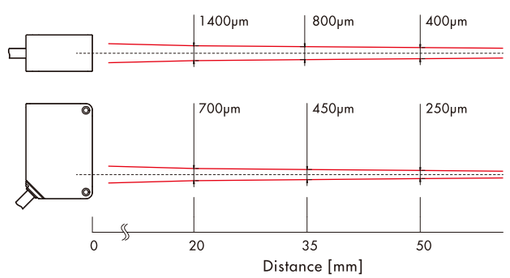


Spot size

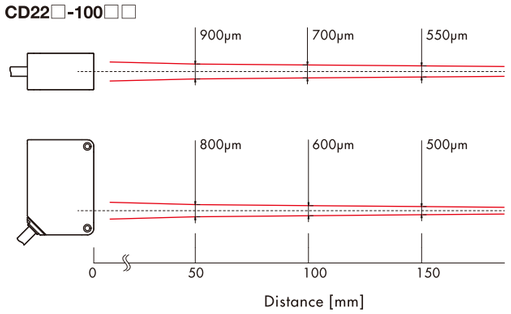
CD22□-15□□



CD22□-35□□

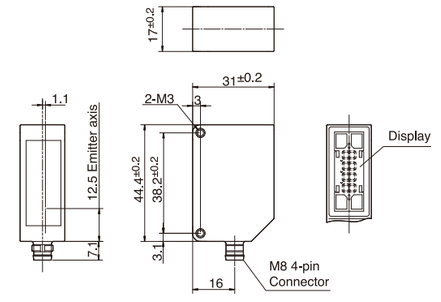


CD22□-100□□

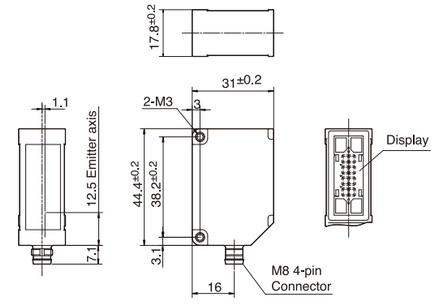


Dimensions

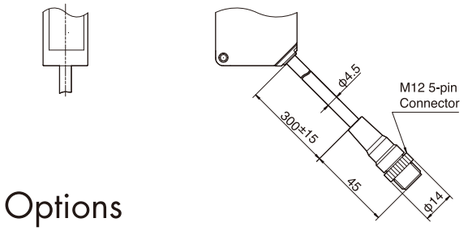
SUS housing M8 connector type



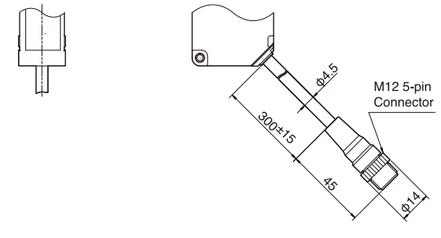
Aluminum housing M8 connector type



SUS housing M12 connector type



Aluminum housing M12 connector type



Options

M12 connector cable

DOL-1205-G02M-R : 2meter
DOL-1205-G05M-R : 5meter

M8 connector cable

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

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

Model number legend

CD22 □ - □□□□□□□□□

- **Housing**: None : Aluminum / M : SUS316
- Measurement center distance (mm)
- **Output**: V : Voltage 0-10V / A : Current 4-20mA / -485 : RS-485
- **Laser Class**: None: Class 1 / 2 : Class 2
- **Connector**: M12 : M12 / M8 : C

Specifications

Model	Aluminum housing	CD22-15□□	CD22-35□□	CD22-100□□
	SUS housing	CD22M-15□□	CD22M-35□□	CD22M-100□□
Center of measurement range		15 mm	35 mm	100 mm
Measurement range		±5 mm	±15 mm	±50 mm
Light source		Red laser diode (wavelength 655 nm)		
		Max. output: 390 μW		
				Max. output: 1 mW
Laser class	IEC/JIS	Suffix none : CLASS 1 / 2 : CLASS 2		
	FDA	Class II		
Spot size ※1		500 * 700 μm	450 * 800 μm	600 * 700 μm
Linearity		0.1% of F.S.	0.1% of F.S.	0.1% of F.S.
Repeatability ※2		1 μm	6 μm	20 μm
Sampling period		500 μs / 1000 μs / 2000 μs / 4000 μs / AUTO		
Temperature drift (typical value)		±0.02 % / °C of F.S.	±0.02% / °C of F.S.	±0.05% / °C of F.S.
Indicator		Laser indicator: Green / Zero reset indicator: Red Output indicator: Orange / Mode indicator: Red		
MF (multiple function) Input		Laser OFF,Teaching, Sample & Hold, One shot, Zero reset		
Control Output		NPN/PNP max.100mA/DC30V (Residual voltage 1.8 V max.)		
Current consumption		70mA max. including Analog output current		
Protection circuit		Reverse connection protection, Overcurrent protection		
Protection category		IP67 including connection part		
Operating Temp./Humid.		-10 ~ 50 °C/ 35 ~ 85% RH without freezing or condensation		
Storage Temp./Humid.		-20 ~ 60 °C / 35 ~ 85% RH		
Ambient illuminance		Incandescent lamp: 3,000 lx max.		
Vibration resistance		10 ~ 55 Hz, Double amplitude 1.5 mm, X,Y,Z for 2 hours		
Shock resistance		500 m/s² (approx. 50G) X,Y,Z 3 times each		
Material		Case : Aluminum / SUS316, Front lens : PPSU, Display: PET		
Weight		Aluminum housing with M12 connector 300 mm cable with connector : Approx. 60 g including 300mm cable with connector SUS housing with M12 connector type 300 mm cable with connector : Approx. 90 g including 300mm cable with connector Aluminum housing with M8 connector : Approx. 40 g SUS housing with M8 connector : Approx. 70 g		

The specifications are based on the condition unless otherwise designated: Ambient temperature: 23°C , Supply voltage: 24VDC, Sampling period: 500μs, Averaging: 64, Measuring distance: Center of the range, Testing object: White ceramic

※ 1 Defined with center strength 1/e2 (13.5%) at the center. There may be leak light other than the specified spot size. The sensor may be affected when there is a highly reflective object close to the detection area.

※ 2 512 averaging time

Specifications per output

Model	CD22□-□□V□	CD22□-□□A□	CD22□-□□-485□
Type	Voltage output	Current output	RS-485 type
Analog output range	0 ~ 10 V	4 ~ 20 mA	—
Maximum load impedance	—	300 Ω	—
Output impedance	100 Ω	—	
Power supply	DC18 - 24 V ± 10 %	DC12 - 24 V ± 10 %	

CD1 series

- Compact design ideal for built-in use with OEM machines.
- Versatility from 30 ±4mm to 250 ±150mm distance.
- If a display and signal control is needed both the digital and analog output of the CD1 can be connected to a digital panel meter.

LINEUP

CD1-30

30mm distance type

Sorting of mechanical parts

Measurement range : 30 ±4mm
Resolution : 1 μm (Responce speed 100msec)
Linearity : ±2% F.S.

CD1-50

50mm distance type

Level check of food package

Measurement range : 50 ±10mm
Resolution : 3 μm (Responce speed 100msec)
Linearity : ±1% F.S.

CD1-100

100mm distance type

Height of components on the board

Measurement range : 100 ±35mm
Resolution : 15 μm (Responce speed 100msec)
Linearity : ±2% F.S.

CD1-130

130mm distance type

Cap of bottled beverage

Measurement range : 130 ±50mm
Resolution : 20 μm (Responce speed 100msec)
Linearity : ±3.5% F.S.

CD1-250

250mm distance type

Doubled part of black rubber sheet

Measurement range : 250 ±150mm
Resolution : 150 μm (Responce speed 100msec)
Linearity : ±5% F.S.

CD1 ADVANCED TECHNOLOGY

All the basic functions packed in a half-plam size, ideal for OEM use.

Teach-in system

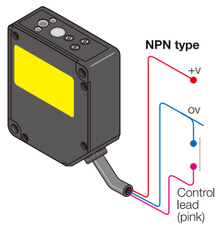
The CD1 is simple to setup and easy to operate.
It is not necessary to make manual adjustments to the sensor, just push the button.

All-in-one solution

The amplifier and sensor are built-in, the CD1 is a complete self-contained sensor.

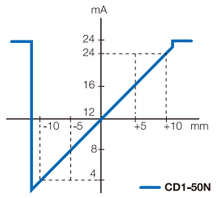
Remote teaching input

The teaching procedure can be carried out remotely by using the remote teach input. There is no need to perform this step at the sensor.
This feature is good for OEM machine builders.



Dual output - Digital On/Off and analog

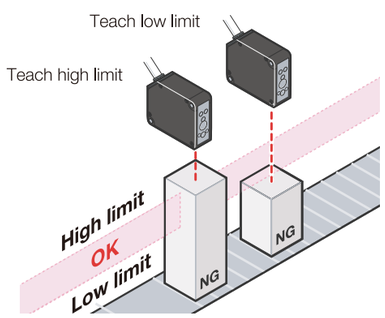
There is a choice of NPN or PNP transistor for the control output, choose the model number based on the desired type.
The 4 to 20 mA analog output is standard on both types.



Easy set-up and measuring

The high and low limit of the measuring range can be set.

1: Go to the SET mode.
2: Teach the high and low limit using the workpiece.
3: Return to RUN mode.



Class 2 laser product

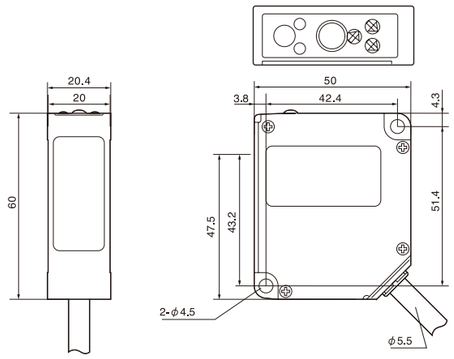
Classified to Class 2 laser, 650mm, max 1mW.

IP67 rating

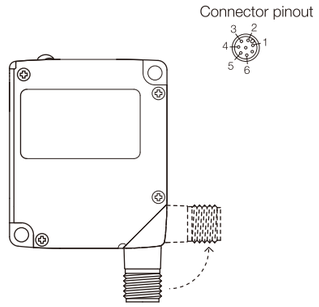
This stand-alone unit is protected with IP67 design.

Dimensions

Cable type



M12 Connector type



(mm)

Specifications

Model	Cable	CD1-30N / P	CD1-50N / P	CD1-100N / P	CD1-130N / P	CD1-250N / P
	M12 Connector	CD1-30CN / CP	CD1-50CN / CP	CD1-100CN / CP	CD1-130CN / CP	CD1-250CN / CP
Transistor output		N = NPN output, P = PNP output				
Measurement range		30 ±4mm	50 ±10mm	100 ±35mm	130 ±50mm	250 ±150mm
Full scale		8mm	20mm	70mm	100mm	300mm
Light source		Class 2 laser, 650nm, max 3.3mW				
Spot size		ϕ0.1mm	ϕ0.5mm	0.5×1.2 mm	0.5×1.5 mm	0.8×1.2 mm
Supply voltage		12 - 24VDC (–5 to +10%)				
Power consumption		Max 120mA (12VDC), 75mA (24VDC), including analog output current				
Resolution (typical value)		(Unit : Micron. Under AUTO sensitivity. White ceramic as an object)				
(Response speed 100msec)		1	3	15	20	150
(Response speed 10msec)		3	10	50	70	500
(Response speed 1msec)		10	30	150	200	1500
Linearity		±2% F.S.	±1% F.S.	±2% F.S.	±3.5% F.S.	±5% F.S.
Temp drift		±0.02% F.S. / Celsius				
Response time		100msec / 10msec / 1msec selectable				
Sensitivity adjustment		SET / FIX / AUTO				
Analogue output		4-20mA				
Control output		NPN or PNP, Max 100mA / 30VDC, Residual voltage max 1.8V				
Distance indicator		Red = Near, Orange = Middle, Green = Far, Red / Green = Error *Remark : Errors as "out of measuring range", "Too high reflection", etc				
Stability indicator		Green = Stable, Red = Error, No light = Unstable, need adjustment				
Output indicator		Orange = Output				
Teach-in indicator		Green = Input, Red = Error				
Blanking input		NPN = Gray wire to 0V, PNP = Gray wire to +V				
Delay function		Off delay 40msec				
Environmental illuminance		Sun light : Max 10,000 lux, Incandescent Lamp = Max 3,000 lux				
Operating temp		–10°C to +40°C				
Operating humidity		35% to 95% RH				
Material		Zinc diecast				
Protection category		IP67				
Conformity		CE				
Warm-up time		30 minutes				
Weight		Approx.130g (Without cable)				

UQ1


(For CD5 series)
UQ1-01


(For CD33 series)
UQ1-02

Enables easy connection of displacement sensors and Mitsubishi PLC MELSEC-Q series

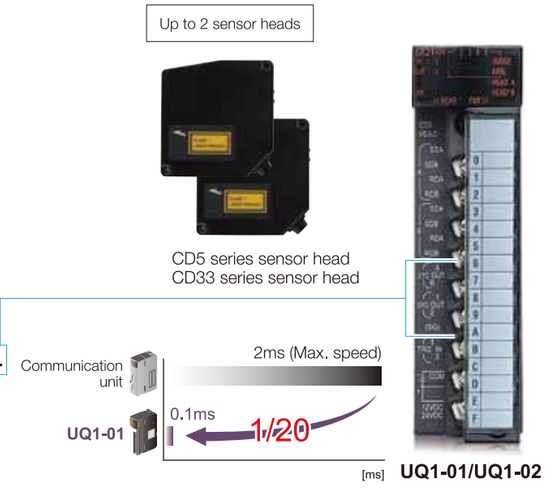
High speed process by 3 NEW feature

No load on the CPU

The unit gets measured data from the sensor automatically and updates calculation result and control output in 100µs (Max. speed)
These process are done by the unit itself so there is no load on the CPU.

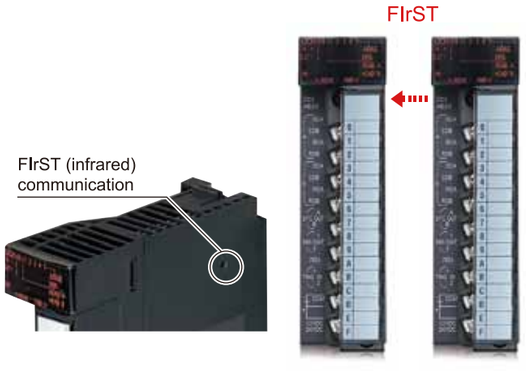
Up to 100µs (Max. speed)

Response speed: 100µs (Max. speed)
independent of scan time of sequencer CPU and it's realized by having I/O terminal (2 for each) on the unit.



High speed original infrared communication "FIrST"

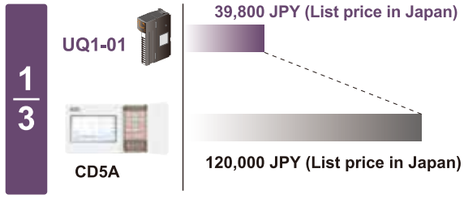
UQ1 units can communicate through "FIrST" infrared communication which was originally developed for the UQ1 series.
It can calculate using data from the CD5/CD33 sensor head connected to another UQ1 units in 100µs (Max. speed). * Max. speed of UQ1-02 is 500µs



One third of the cost needed for conventional solution (UQ1-01 + CD5)

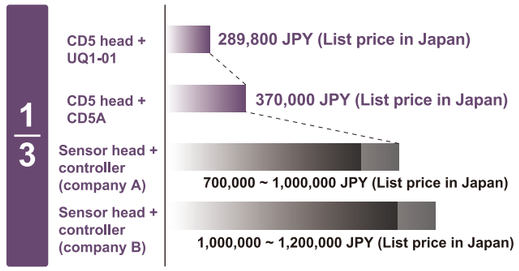
Comparing with standard controller

One third of standard controller (CD5A) cost.



Comparing with competitor solution

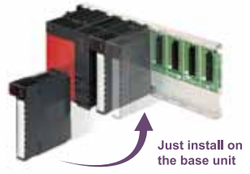
The CD5 series Sensor head along with the UQ1 controller is a very cost effective solution and is typically a 1/3 the price of conventional Laser measurement sensors.



Easy connection & Easy setup

Communication setup is not needed

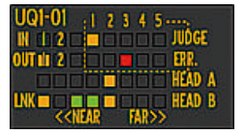
UQ1 series is recognized simply by installing on the MELSEC-Q series base unit with no communication setup required. There is also no communication setup needed between CD5/CD33 sensor and UQ1 series.



Easy reading LED display

You can see following information on the LED display easily.

- Measurement result (Q1~Q5)
- Error status (sensor head connection etc.)
- I/O status
- Bar graph (simple status of distance or distribution status)



Easy access software

Dedicated software "UQ1 Navigator" is now available. Easily access the intuitive software, change the setup parameters and check the measurement status without needing knowledge of PLC and ladder programming.

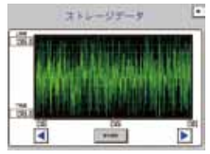

Measurement result


Calculation result

Data/Ladder sample program for GOT are ready

Data/Ladder program (sample) for HMI touch panel GOT are ready.You can setup just by loading them. You can also utilize data storage function of UQ1.

Measurement result on the GOT


Storage data on the GOT

Specifications

Model		UQ1-01	UQ1-02
I/O points to occupy		32 points (I/O: Intelligent 32 points)	
Sampling period		100μs Min	500μs Min.
Communication method		Infrared	
Terminalblock	Usable wire	Core: 0.3 ~ 0.75mm2 (Outer diameter: Max. 2.8mm)	
	Usable soldeless terminal	R1.25-3 without sleeve	
Communication I/F (between UQ1 and CD5)	No. of head	2 Heads Max.	
	Protocol	RS-422	
	Baud rate	921.6kbps	256kbps
	Cable	DOL-1212-G05M (5m sensor head cable)	
	Cable extension	Up to 50m using optional extension cable (unbundled)	
Control input / output	No. of I/O	2 Input / 2 Output	
	Mode	NPN open collector	
	Output voltage	12 - 24VDC (±10%)	
	Output current	80mA (DC12-24V)	
	Residual voltage	1V Max.	
	Leak current	0.2mA Max.	
	Protection	Over current protection circuitry	
Trigger input	Logic	ON by connecting to GND (0V)	
	Voltage	ON voltage: 1.0V Max. / OFF voltage: 2.0V Min.	
	Input impedance	Approximately 10kΩ	
Function		Setup sensor head, Control output, Calculation,Hold function, Filter function, Bank setup,Storage function	
High speed logging point		262,144 points Max.	
EEPROM over writing limit		Max. 1000,000 times for same memory area	
DC5V current consumption		0.5A Max.	
Noise tolerance		500Vp-p (simulator), Noise width: 1μs Fast transient noise 1kV (IEC 61000-4-4)	
Insulation resistance		Min. 10MΩ (insulation resistance meter)	
Protection category		IP2X	
Operating Temp./Humid.		-10°C to +55°C / 35 ~ 85%RH (non condensation)	
Storage Temp./Humid.		-20°C to +70°C / 35 ~ 85%RH (non condensation)	
Vibration resistance		10 ~ 55Hz,1.5mm,X-Y-Z each for 2 hours	
Dimensions		98(H) * 27.4(W) * 90(D) [mm]	
Weight		Approximately 150g	

Displacement Sensor

LS
CD5
CD4
CD33
CD3
CD22
CD1
UQ1