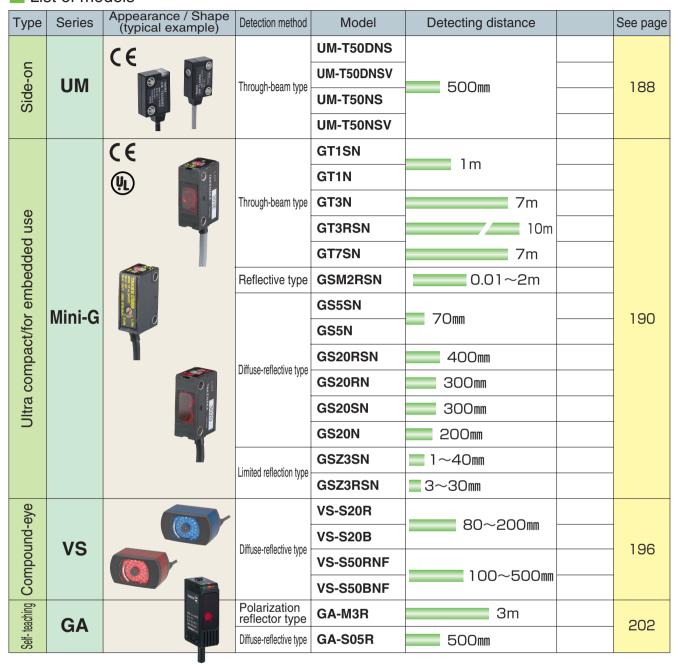


- ASG Series
- **UM2** Series
- GN Series
- **UM Series**
- Mini-G Series
- VS Series
- GA Series
- Middle-G Series
- NT Series
- CX Series
- DLZ Series
- GM Series
- LD-M/LD-S Series
- LD Series
- PF Series
- GA/NES Series
- NAL Series
- NE-DC Series
- NEF Series
- PU/AS Series

Туре	Series	Appearance / Shape (typical example)	Detection method	Model	Detecting distance		See page
Glass detection	ASG		Diffuse-reflective type	ASG-S20R	20mm		170
Gle	AGG		Limited reflection type	ASG-Z15R	3 ∼15mm		170
				UM2-T15DT	150mm		
				UM2-T15DTV	13011111		172
ture		A STATE OF THE STA	Through-beam type	UM2-T50DT			
Ultra Miniature	UM2		Through beam type	UM2-T50DTV	500mm		
ğ ⊠	O.III.			UM2-T50DS			172
D I		TAKEN TO THE TOTAL		UM2-T50DSV			
		BEOFF	Limited reflection type	UM2-Z3SV	5~30mm		
			Limited Tellection type	UM2-Z3DSV	0 00mm		
nse		C€	Through-beam type	GN-T10RS	10m		
I I -in		c (VL) us		GN-T10RS-J	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7		
r bui	GN		Polarization	GN-M2RS	N-M2RS 0.03~1.3m		178
Compact/for built-in use			reflector type GN-M2RS-J				170
mpa			Diffuse-reflective type	GN-R40RS	400mm		-
ပိ				GN-R40RS-J	100111111		
				UM-T15DT	150mm		-
		CE		UM-T15DTV			
		(l) (m)		UM-T50DT			
			Through-beam type	UM-T50DTV	500mm		
<u>ə</u>			,	UM-T50DS			
Ultra Miniature				UM-T50DSV			
Αij	UM	UM-R5T		UM-T100DT	1 m		184
JItra		#: 12-24V #: 0V		UM-T100DS			
ا ر				UM-R3T	2~30mm		
		0000	Diffuse-reflective type	UM-R3TV			
		UM- TRSODT TLSOT	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	UM-R5T	2~50mm		
		A: 0V X:24V		UM-R5TV			
		I	Limited reflection type	UM-Z3SV	■ 5~30mm		

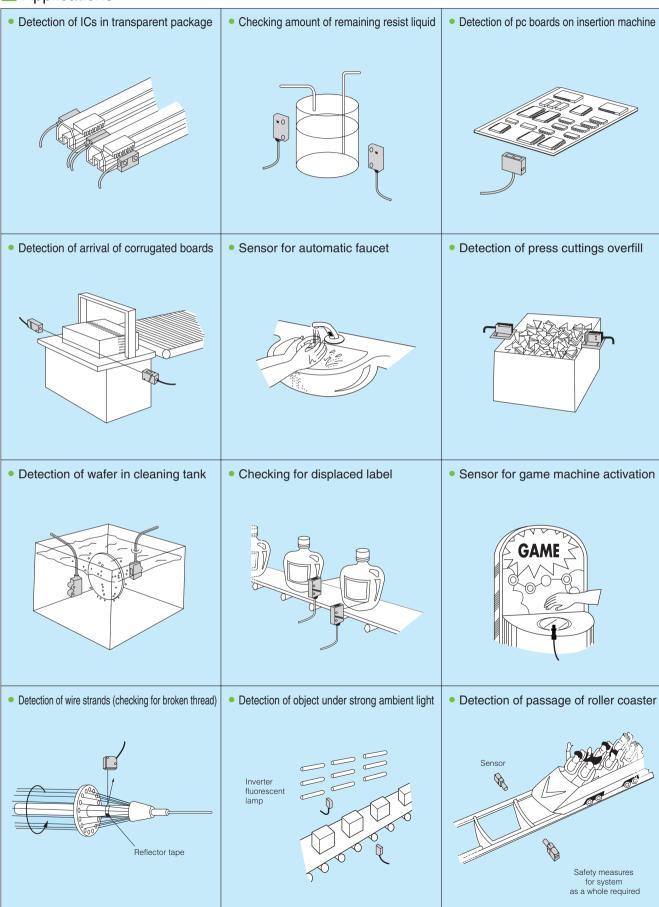


Туре	Series	Appearance / Shape (typical example)	Detection method	Model	Detecting distance		See page
		CE 🗻		GT5RSN			
		(h)	Through-beam type	GT5RSN-J	7m		_
			i i i i ougii-beaiii type	GT5RN	/ / / / / / / / / / / / / / / / / / / /		
		TAKEX		GT5RN-J			
Se		The last section of the la	Polarization	GMR2RSN			
Compact/for embedded use		2120 DATE OF THE PROPERTY OF T		GMR2RSN-J	0.3~1.5m		
ppe			reflector type	GMR2RN	0.5 7 .5111		
mpe	Middle-G			GMR2RN-J			210
or e	Wilduic-G	TAKEX	Diffuse-reflective type -	GSR05RSN			210
act/f				GSR05RSN-J	500mm		
duc				GSR05RN			
ပိ				GSR05RN-J			
			Limited reflection type	GSZ5RS			
				GSZ5RS-J	- <u>20~50mm</u>		_
			Limited remodeler type	GSZ5R			
				GSZ5R-J			
Die-cast	NT	CE	Through-beam type	NT30F	30m		216
=		CE	Through-beam type	СХТ8	3m		
Cylindrical	СХ		Polarization reflector type	CX-M2RD	2m		220
Sylin			Diffuse-reflective type	CX-R01	100mm		220
			Diliado folloctivo type	CX-R03V	300mm		

Туре	Series	Appearance / Shape (typical example)	Detection method	Model	Detecting distance		See page	
PCB detection	DLZ	CE	Limited reflection type	DLZ-S30(D)	■10~30mm		224	
PCB de	GM		,"	GM-S/Z	50mm		226	
	LD-M	CE CE	Polarization reflector type	LD-M10R	3~15m		228	
_	LD-S		Diffuse-reflective type	LD-S20R	80~300mm		220	
lase			Through-beam type	LD-T20R				
Red laser	LD			LD-T20R-C1	20m		234	
	LD	CE	Reflective type mark sensor	LD-S33R	200~400mm		204	
tance	PF	CE P	Through-beam type	PF-T3DS(S)	3m		240	
Resistance chemicals	PF	Diffuse-re	Diffuse-reflective type	PF-R03S(DS)	300mm		240	
Transparent lobjects	GA		Reflector type	GA-MT1R	1 m		244	
nspa bject	NES	TRACE (I) GAMTIR post of a service	Polarization	NES-MT1	0.2~1m		248	
	NES	The state of the s	reflector type	NES-MT1D	0.2 - 1111		240	
Polarization	NAL		Polarization reflector type	NAL-M10RTC	0.5~10m		250	
(0		CE	Through-beam type	NE-T10RD-DC	10m			
lities	NE DO	A	, ,	NE-T30D-DC	30m		254	
faci	NE-DC		Polarization reflector type	NE-M5RD-DC	0.03~5m		254	
For logistics facilities			Diffuse-reflective type	NE-R10-DC	1 m			
ogis			Through-beam type	NEF-T10RD	10m			
-or	NEF		Polarization reflector type	NEF-M5RD	0.03~5m		258	
		•	Diffuse-reflective type	NEF-R50	1 m			

Туре	Series	Appearance / Shape (typical example)	Detection method	Model	Detecting distance	See page
or)	PU	CE CE		PU5	5mm fixed	
sensor)	10			PU10	10mm fixed	
		Salah o		AS-U20	19mm	
(address			Through-beam type (U-shaped)	AS-U20D	1 3 111111	260
	AS			AS-U25	25mm fixed	200
ped	AU			AS-U25D	25IIIII TIXEU	
U-shaped				AS-U30	30mm fixed	
				AS-U30D	30IIIII Tixed	

Applications



ASGSeries



Reliably detects inclined transparent glass

Ideal for flush-mounting in robot end-effecter.

 Unique optical system allows stable detection regardless of warpage or inclination of glass

Unprecedented reliability in inclined object detection is realized by the use of two red LED light sources

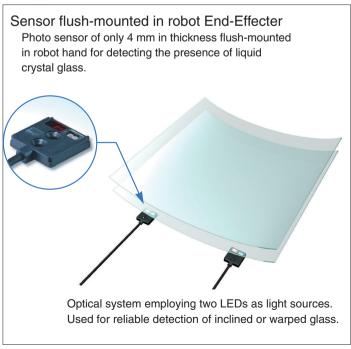
 Thin (4mm) embedded amplifier photo sensor

Counterbores for M3 countersunk screws convenient for flush-mounting in robot end-effecter.

Type

Detection method	Detecting distance	Model	Operation mode	Output mode
Diffuse-reflective type	20mm	ASG-S20R	Light-ON	NPN
Limited reflection type	3~15mm	ASG-Z15R	Ligiti-ON	Open collector

Applications



Difference between ASG-S20R and ASG-Z15R

- ASG-S20R is a diffuse-reflective type sensor with a wide activation range.
 - If the detected glass is warped, the detecting distance can be 25 mm at maximum.
- ASG-Z15R is a limited zone-reflective sensor with a wide activation range.
 - If the glass to detect is warped, the detecting distance can be 18 mm at maximum. The sensor is not activated by transparent glass in contact with the sensor.

ASG

Rating/Performance/Specification

		Гуре	ASG-S20R	ASG-Z15R		
	Detecti	on method	Diffuse-reflective sensor for glass detection	Limited zone-reflective sensor for glass detection		
	Detect	tion object	Transpar	ent glass		
	Detection	ng distance	Transparent glass 20mm max. 25 mm max. (*)	Transparent glass 3 - 15 mm 18 mm max. (*)		
ce	Powe	er supply	12~24V DC ±10%	/ Ripple 10% max.		
Rating/performance	Ligh	t source	2 red LEDs			
rforr	Current	consumption	25 mA max.			
)/pe	Opera	tion mode	Light-ON			
ting	Output	Control output	NPN open co	llector output		
R	mode	Rating	Sink current 50 m	A (30 VDC max.)		
	Short circ	cuit protection	Provided			
	Ind	dicator	Operation indicator : orange LED			
	Respo	onse time	0.5 ms max.			
	Con	nection	Permanently attached cord (0.15 sq. 3 core 2m length)			
	N	Mass	Approx. 30 g			

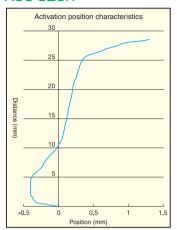
(*) The maximum distance means the distance to the farthest part of an inclined transparent glass. This sensor does not have a sensitivity adjustment volume and must be used with no object interfering with the detection in the surrounding area.

■ Environmental Specification

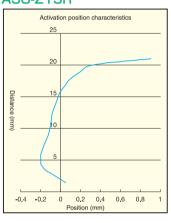
	Ambient light	5,000 lx max.
Environment	Ambient temperature	-10 - +55 -C (non-freezing)
ron	Ambient humidity	35~85%RH (non-condensing)
į	Vibration	10 - 55 Hz / 1.5 mm amplitude / 2 hours each in 3 directions
ш	Protective structure	IP40

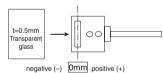
Activation Position Characteristics (Typical Example)

• ASG-S20R



• ASG-Z15R

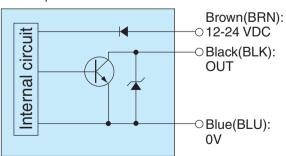




0 mm point
Position up to this point: negative (-)
Position after this point: positive (+)

■ Input/Output Circuit and Connection

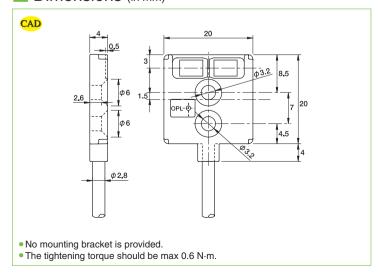
NPN output



 The output transistor turns off when load short circuit or overload occurs.

Check the load and turn the power back on.

Dimensions (in mm)



UM2 Series



- Highly-advanced type of ultra miniature sensor
- High-intensity indicator and red LED light source

Allows long distance checking of both sensor operation and light transmission.

- NPN and PNP output types are available
- Excellent water resistance to IP 67 standard

Sensor allows washing with water.

Type

Detection method	Detecting distance	Model	In-line sensitivity adjustment volume	Operation mode	Output mode
	150mm	UM2-T15DT			
	130	UM2-T15DTV	Provided		
(1)	500mm	UM2-T50DT		Dark-ON	NPN Open collector Contact Takex for PNP-
Through-beam type		UM2-T50DTV	Provided	Contact Takex for Light-ON type.	
		UM2-T50DS			
		UM2-T50DSV	Provided		output type.
Limited reflection type	5~30mm	UM2-Z3SV	Provided	Light-ON	
		UM2-Z3DSV	1 TOVIGEG	Dark-ON	

 In-line sensitivity adjustment allows for wider range of applications Models with space-saving and easy-to-use in-line volume adjustment are available.



- Length of cord between sensor (receiver) and in-line sensitivity adjustment: 300 mm (fixed)
- Mounting bracket (separately available): model UM-V2

■ Rating/Performance/Specification

		Тур	ре	UM2- T15DT	UM2- T15DTV	UM2- T50DT	UM2- T50DTV	UM2- T50DS	UM2- T50DSV	UM2- Z3SV	UM2- Z3DSV
	Detec	tion	method			Through-l	peam type			Limited reflection type	
	Detec	ting	distance	150	mm	500mm				5 - 30mm*	
٥	Dete	ctio	n object	φ 2mm (Mi	n.) Opaque	φ 3mm (Min.) Opaque					
2 2	Pow	er :	supply		24V	DC ±10% / R	ipple 10% ma	x. *1		12 - 24V DC ±10%	/ Ripple 10% max.
rforu	Curren		Transmitter			15mA	max.			26mA max.	30mA max.
/n	consumpt	ion	Receiver	15mA max.	22mA max.	15mA max.	22mA max.	15mA max.	22mA max.	ZomA max.	John max.
Bating/nerformance	Out	put	mode		Rating: sink of	current 80 mA	NPN oper (30 VDC) ma		put type also	available. *2)	
	Oper	atio	n mode		-	Dark	k-ON	·		Light-ON	Dark-ON
	Resp	ons	se time				0.5ms	s max		•	
	Oper	atin	g angle			15° (at r	eceiver)				
	Ну	Hysteresis						Up to 10% of detecting distance			
	Light source (light wavelength)			Red LED (660nm)							
	Ir	Indicator			Operation indica	, ,	LED)—— For D)	through-bean	n type, provid	ed on receive	r.
_		ume	e (VR)		In-line sensitivity adjustment		In-line sensitivity adjustment		In-line s	sensitivity adj	ustment
ot i	Materi	al	Case				ABS	resin			
Specification	Ivialeii	ai	Lens				Acrylic	resin			
Dec						Permanently	attached cord	(outer dimen	sion: dia. 2.8)		
C.	' Co	nne	ection		Transmit	ter: 0.15sq. 2	core 2 m leng	th (gray)		0.15sq. 3 co	re 2 m length
				Receiver: 0.15sq. 3 core 2 m length (black)				(bla	ack)		
	Mass	,	Transmitter				x. 30g			Appro	x. 40g
	Receiver Approx. 30g Approx. 40g Approx. 30g Approx. 40g Approx. 40g Approx. 30g Approx. 40g										
	Ac	ces	sory	•			driver for adjustme			***	
		Not	es		•		hite drawing pa	•	, ,	e also available	
				*2 PNP outpu	it type models	identified by X	Pŧ at the end o	of model numb	er. Comes wit	th output conve	ersion unit.

Environmental Specification

Ħ	Ambient light	3,000 lx max.
nent	Ambient temperature	-25 - +55 -C (non-freezing)
on	Ambient humidity	35 - 85%RH (non-condensing)
Environn	Protective structure	IP67
Ш	Vibration	10 - 55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction

• Applicable power supply unit

PS series

High capacity of 200 mA at 12

VDC

(General-purpose type) PS3N

PS3N-SR

(Multifunctional type) PS3F

PS3F-SR

UM2

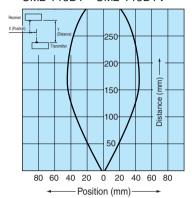
■ Input/Output Circuit and Connection

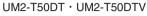
Model	Input/output circuit and connection
NPN output type UM2-T15DT UM2-T50DT UM2-T50DS	Lead color Brown: Power supply Black: Output (NPN open collector) Blue: 0V The transmitter is provided with power supply lines (brown: operating power; blue: 0 V) only.
NPN output type with in-line sensitivity adjustment UM2-T15DTV UM2-T50DTV UM2-T50DSV UM2-Z3SV UM2-Z3DSV	Brown: Power supply Black: Output (NPN open collector) Blue: OV
PNP output type UM2-T15DTP UM2-T50DTP UM2-T50DSP	The transmitter is provided with power supply lines (brown: operating power; blue: 0 V) only. PNP open collector output available with in-line output conversion unit. Lead color Brown: Power supply Black: Output (PNP open collector) Blue: 0V The transmitter is provided with power supply lines (brown: operating power; blue: 0 V) only.
PNP output type with in-line sensitivity adjustment UM2-T15DTVP UM2-T50DTVP UM2-T50DSVP UM2-Z3SVP UM2-Z3DSVP	PNP open collector output available with in-line volume/output conversion unit. Lead color Brown: Power supply Black: Output (PNP open collector) Blue: 0V The transmitter is provided with power supply lines (brown: operating power; blue: 0 V) only.

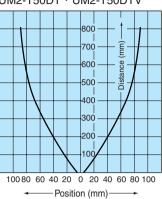
■ Characteristics (Typical Example)

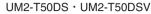
• Directional characteristics

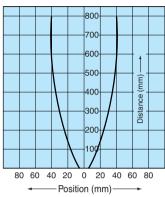
UM2-T15DT · UM2-T15DTV





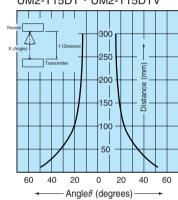




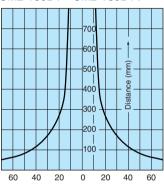


Operating angle characteristics

UM2-T15DT · UM2-T15DTV

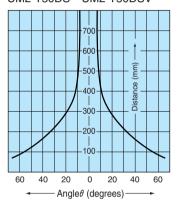


UM2-T50DT · UM2-T50DTV



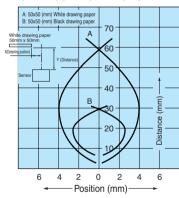
- Angleθ (degrees)-

UM2-T50DS · UM2-T50DSV



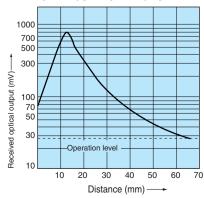
Activation area characteristics

UM2-Z3SV · UM2-Z3DSV



Distance-area characteristics

UM2-Z3SV · UM2-Z3DSV



UM2

For Correct Use

Be sure to follow the instructions in the operation manual provided for correct use of the product.



- •Do not use the product for detection for the protection of human body.
- ·When using the product for safety purposes, ensure safety with the control system as a whole as well as the detection.
- ·This product is not explosion proof.

About indicators

- The operation indicator (orange LED) and stability indicator (green LED) show the levels of light intensity as described in the figure below.
- After aligning the optical axis and adjusting the sensitivity, use a
 detection object to block and unblock the light beam several
 times to make sure that the sensitivity level is in a range that
 allows stable activation and deactivation. Setting the sensitivity
 in a range allowing stable operation achieves higher reliability
 against changes in the operating environment generated after
 the sensitivity is set.



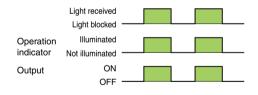
• The orange LED (OP.L) is the operation indicator.

In the L.ON (light ON) mode, the indicator is illuminated when a certain amount of light is detected.

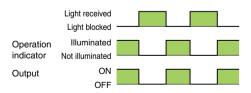
In the D.ON (dark ON) mode, the indicator is illuminated when a certain amount of light is not detected.

Operation timing chart

Light-ON mode



Dark-ON mode



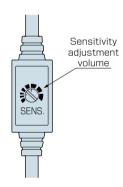
Sensor mounting and adjustment

- No mounting bracket is provided.
- For mounting, use the M2 x 10 screws, washers and nuts provided.

The tightening torque should not exceed 0.3 N·m. Excessively high torque may damage the sensor.

• The models with an in-line volume allows sensitivity adjustment when light is not adequately blocked due to translucent or small objects in detection with a through-beam-type sensor or when any influence of the background must be avoided or the amount of reflected light is small in detection with a reflectivetype sensor.

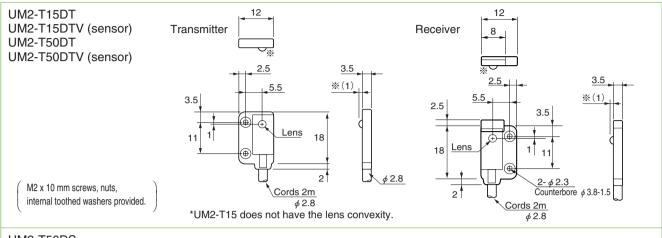
Turning the volume counterclockwise reduces the sensitivity.

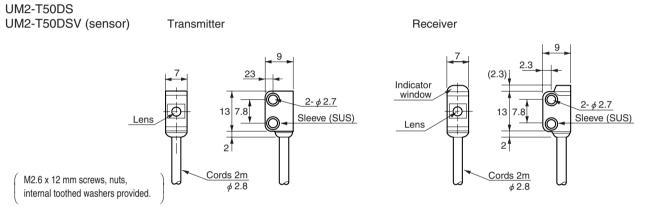


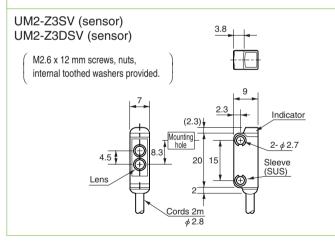
Notes on usage

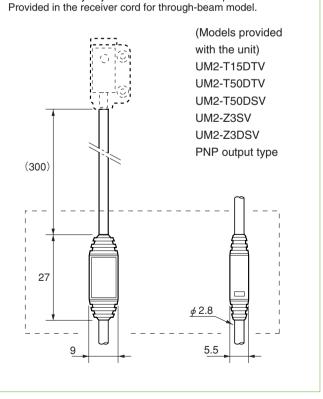
- Avoid use in which the power is turned on and off consecutively.
- For output, avoid the transient condition immediately after power-up (50 ms).
- To extend the cord, use thick wires (at least 0.3 mm2) and limit their length to within 50 m whenever possible. Take voltage drop into consideration when the length exceeds 50 m.
- Be sure to route the sensor lines separately from any power transmission or high-voltage line. Using the same conduit or duct may cause electric induction, which leads to faulty operation or damage.

Dimensions (in mm)









• In-line sensitivity adjustment volume/PNP output conversion unit

For mounting, directly screw onto the surface.
 The tightening torque should be up to 0.3 N·m.

GNseries



- New type of amplifier built-in photo sensor
- Slim and compact side-on models
 - Lightweight and compact
 Thin, space-saving sensor allowing flexible mounting
 - Flat lens less affected by dust or dirt attached Superb stability with the high power (detecting distance of 10 m)
 - High-intensity indicators for increased visibility
 Easy checking of sensor operation from a distance

Type

Detection method	Detecting distance	Mo	del	Operation mode	Output mode	
Detection method	Detecting distance	NPN type PNP ty		Operation mode	Output mode	
Through-beam type	10m	GN-T10RS	GN-T10RSPN			
Polarization reflector type	0.03~1.3m	GN-M2RS	GN-M2RSPN	Light-ON/Dark-ON selectable (with switch)	Open collector	
Diffuse-reflective type	400mm	GN-R40RS	GN-R40RSPN			

Infrared LED type

For the through-beam and diffuse-reflective models, types that employ infrared LED as the light source are available. Fro details, see Rating/Performance/Specification.

M8 connector type

M8 connector connection types are available for all models. Fro details, see Rating/Performance/Specification. For connector specifications, see p. 180.

Optional Parts

Туре		Model	Pinhole diameter	Detecting distance with plate/filter attache		
	Type	Model	Direction of polarization	Red LED	Infrared LED	
only		GNP1	<i>φ</i> 1mm	400mm	300mm	
type	Pinhole	GNP2	φ 2mm	1m	1m	
eam	plate	GNP3	φ 3mm	3m	2.5m	
For through-beam type only		GNP5-1	5×1mm	2m	1.7m	
hrou	Interference	GN-PFA	Longitudinal	_	m	
Fort	prevention filter	GN-PFB	Horizontal	(Applicable to re	d LED type only)	

Туре	Model	Shape	
Cord with M8	FBC-4R2S	Straight (2 m)	
connector	FBC-4R2L	Angled (2 m)	



M8 connector type

Rating/Performance/Specification

	Permanently		NPN type	GN-T10RS	GN-T7S	GN-M2RS	GN-R40RS	GN-R30S	GN-R7S
	νŢ	attached cord	PNP type	GN-T10RSPN	GN-T7SPN	GN-M2RSPN	GN-R40RSPN	GN-R30SPN	GN-R7SPN
	Туре	Connector	NPN type	GN-T10RS-J	GN-T7S-J	GN-M2RS-J	GN-R40RS-J	GN-R30S-J	GN-R7S-J
		Connector	PNP type	GN-T10RSPN-J	GN-T7SPN-J	GN-M2RSPN-J	GN-R40RSPN-J	GN-R30SPN-J	GN-R7SPN-J
		Detection r	method	Through-	beam type	Polarization reflector type	Di	ffuse-reflective ty	ype
		Detecting distance		10m	7m	0.03~1.3m *1	400mm	300mm	70mm
nce	Detection object		φ 6mm (M	in.) Opaque	Glossy objects including mirror- like materials and stainless-steel plates or Opaques		tection object: nite drawing paper	Standard detection object: 100 x 100 mm white drawing paper	
ma		Power su	upply		12	2-24V DC ±10%	/ Ripple 10% m	ax.	
Rating/performance	Current consumption			: 22mA max. 15mA max.		25m <i>A</i>	A max.		
/gui	ge	Control	NPN type	Rat	ing: sink current	100 mA (30 VDC	max.) / Residua	al voltage: 1 V or	less
Rat	mode	output	PNP type		ng: source curren				
	Output	Stability	NPN type	Ra	ting: sink current	50 mA (30 VDC	max.) / Residua	l voltage: 1 V or l	ess
	O	outpuť	PNP type	Rati	ng: source currer	nt 50 mA (30 VD)	C max.) / Residu	al voltage: 2 V or	less
	Operation mode			Light-ON/Dark-ON selectable (with switch)					
	Α	Anti Interference feature		——— Provided (operation may be affected depending on the setting)					
	Response time		0.5ms max.						
	Operating angle			10° (at	receiver)	30° (at reflector)			
		Hysteresis				10% max.			
		Light source (light	wavelength)	Red LED (700nm)	Infrared LED (880nm)	n) Red LED (640nm) Infrared LED (880n		ED (880nm)	
	Indicator		tor		ndicator (orange LED) indicator (orange LED) een LED)	Uperation indicator (orange LED)		·	
		Volume	(VR)	Sensitivity adjustment (on receiver for through-beam type)					
		Switch (SW)		Light-ON/Dark-ON selector switch				
⊑	5	Short circuit p	protection		Provid	ded for control ou		output	
atio	Material	Ca	se				terephthalate		
ific	Mat	Le	ns			Metha	crylate		
Specification	Connection	Permanently a	attached cord	(outer dimer Transmitter 0.2sg. 2	attached cord nsion: dia. 3.5) core 2 m length (gray) ore 2 m length (black)	Permanently attached cord (outer dimension: dia. 3.5) 0.2sq. 4 core 2 m length (black)			n: dia. 3.5)
	ဝိ	Conn	ector		M8 connecto	r (cord with M8 c	onnector separa	tely available)	
	Mass	Permanently a	attached cord	Transmitter/rece	eiver: approx. 60g		Appro	ox. 60g	
	Ma	Conn	ector	Transmitter/rece	eiver: approx. 10g		Appro	ox. 10g	
		Access	ory	Screwdriver for sens	K-71 reflector Screwdriver for sensitivity adjustment, operation manual, mounting bracket GN-B1 (provided for permanently attached cord type only)				

^{*1} The distance with use of K-7 (separately available) is 0.01 - 2 m.

Environmental Specification

	Ambient light	5,000 lx max.		
	Ambient temperature	-25 - +55 -C (non-freezing)		
Environment	Ambient humidity	35 - 85%RH (non-condensing)		
l E	Protective structure	IP67		
iro	Vibration	10 - 55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction		
ШÉ	Dielectric strength	AC1000V 1 min.		
	Insulation resistance	500 VDC, 20 MΩ or higher		
	Shock	500 m/s ² / 3 times each in 3 directions		

• Applicable power supply unit

PS series High capacity of 200 mA at 12 VDC

(General-purpose type) PS3N PS3N-SR

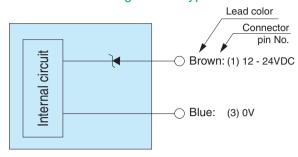
(Multifunctional type) PS3F

PS3F-SR

GN

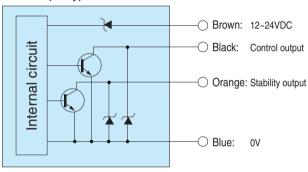
Input/Output Circuit and Connection

Transmitter of through-beam type

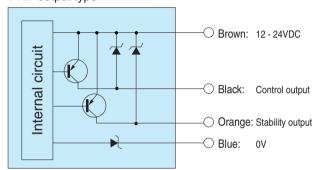


Receiver of through-beam type/polarization reflector type/diffuse-reflective type



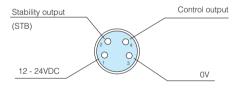




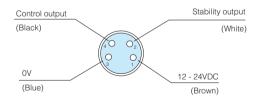


- The output transistor turns off when load short circuit or overload occurs. Check the load and turn the power back on. To extend the cord, use thick wires (at least 0.3 mm²).
- Connector type pin assignment and connection

(Sensor)



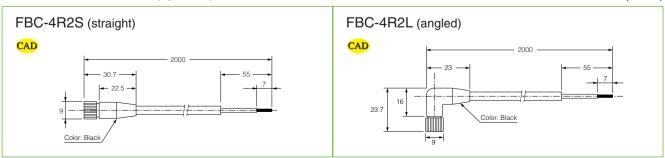
(Cord with M8 connector)



Lead color	Pin No.	Function	
Brown	1	12 - 24 VDC	
White	2	STB output	
Blue	3	0V	
Black	4	Control output	

Cord with M8 connector (optional)

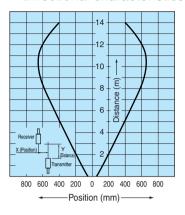
(in mm)



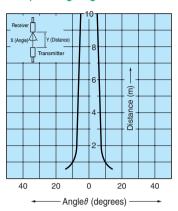
■ Characteristics (Typical Example)

Through-beam type GN-T10RS (PN) (-J) -

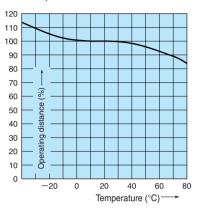
Directional characteristics



Operating angle characteristics

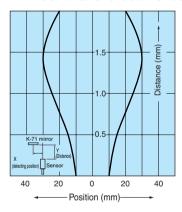


• Temperature characteristics

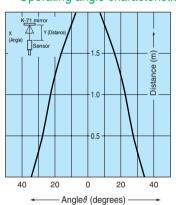


Polarization reflector type GN-M2RS (PN) (-J) -

Directional characteristics

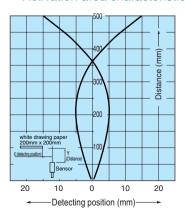


Operating angle characteristics

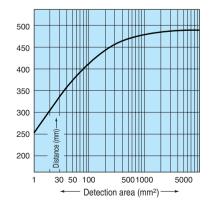


Diffuse-reflective type GN-R40RS (PN) (-J)

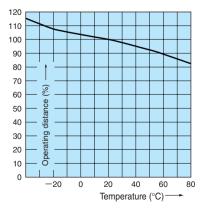
Activation area characteristics



Distance-area characteristics



• Temperature characteristics



GN

For Correct Use

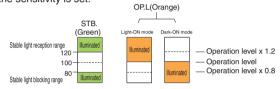
Be sure to follow the instructions in the operation manual provided for correct use of the product.



- •Do not use the product for detection for the protection of human body.
- ·When using the product for safety purposes, ensure safety with the control system as a whole as well as the detection.
- ·This product is not explosion proof.

About indicators

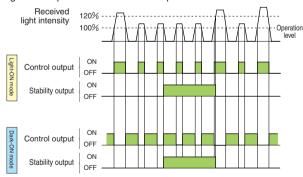
- The operation indicator (orange LED) and stability indicator (green LED) show the levels of light intensity as described in the figure below.
- After aligning the optical axis and adjusting the sensitivity, use a detection object to block and unblock the light beam several times to make sure that the sensitivity level is in a range that allows stable activation and deactivation. Setting the sensitivity in a range allowing stable operation achieves higher reliability against changes in the operating environment generated after the sensitivity is set.



The orange LED (OP.L) is the operation indicator.
 In the L.ON (light ON) mode, the indicator is illuminated when a certain amount of light is detected.
 In the D.ON (dark ON) mode, the indicator is illuminated when a certain amount of light is not detected.

Stability output

The stability output can be used to check for reduction of the light intensity level along with any change in the operating environment or operation over time or to perform initial check of the operation. When two consecutive detections have occurred with the intensity of light detected exceeding the operation level but not reaching 120 % of the level (range allowing stable operation), the stability signal is output when the control output is deactivated.



Reflector of polarization reflector type

The detection distance varies depending on the reflector model used.

Reflector model	K-71	K-7	S-25	
Detecting distance	0.03 - 1.3m	0.01 - 2m	50 - 600mm	
Remarks	Accessory	Optional	Optional	

Mounting of sensor

The tightening torque for mounting screws should not exceed 0.6 N·m.

Switching between light ON and dark ON and setting sensitivity

(For the light ON mode)
Turn the switch to L.ON.

(For the dark ON mode)
Turn the switch to D.ON.

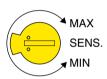




Light-ON/Dark-ON selector (white)



Sensitivity adjustment volume (yellow)



Sensitivity can be adjusted for detection with a transmission-type model in which blocking of the light beam is inadequate due to a translucent or small object or for detection with a reflection-type model in which any influence of the background should be avoided or the sensor must detect low intensity of reflected light. Turning the volume counterclockwise reduces the sensitivity.

For setting the light ON/dark ON switch (white) and adjusting the sensitivity volume (yellow), use the adjustment screwdriver supplied and turn carefully. Turning the volumes with excessive force may damage the volumes.

About pinhole plate

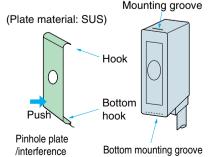
Pinhole plates allow the reduction of the size of a detection object or the margin of movement. Using the sensitivity adjustment volume in combination allows detection of even smaller or near-transparent objects.

Interference prevention filters

When two sensors are mounted close to or in contact with each other, interference prevention filters can be used to avoid faulty operation caused by mutual-interference.

Interference prevention filters can be used only for transmissiontype sensors emitting red light.

Attachment of pinhole plate /interference prevention filter

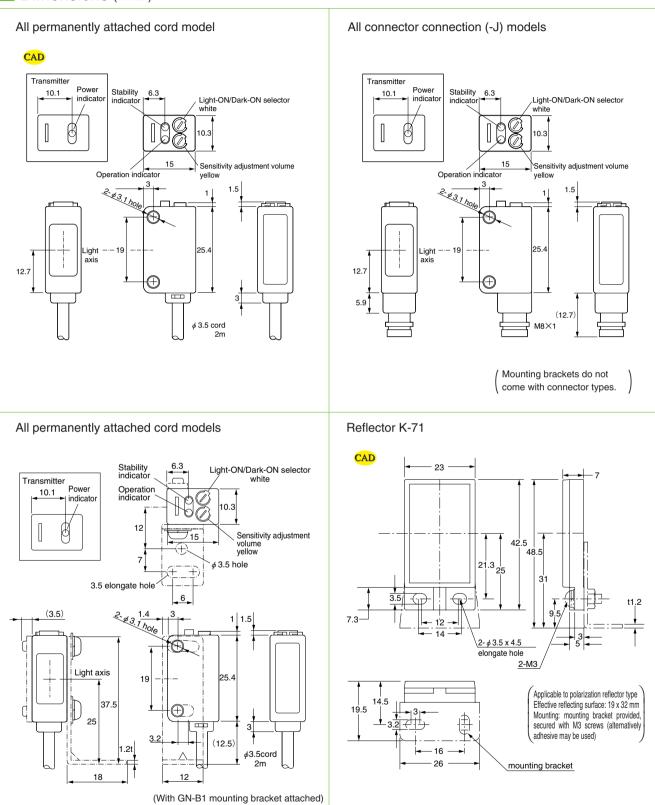


prevention filter

Put a hook of the plate on the mounting groove at the top of the sensor and press the bottom of the plate in until it clicks.

Dust, drops of water, etc. in the pinhole or the filter may cause faulty operation.

Dimensions (in mm)



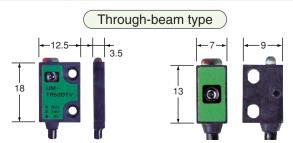
UMseries



- Ultra miniature size (extra thin, extra compact)
- Long distance detecting up to 1 m
- Ideal for integrating into small devices
 - Thinness of 3.5 mm achieved with embedded amplifier type!
 - Extremely small volume: less than 0.8 cm³ Volume fraction: about 1/5 (to conventional Takex product)
 - Low cost
 - Red LED light source allows checking of emitted light spot
 - Equipped with stability and operation indicators
 - Wide range of applications from small-scale FA to system wide FA

Type

Detection method	Detecting distance	Model	In-line sensitivity adjustment volume	Operation mode	Output mode
	150	UM-T15DT			
	150mm	UM-T15DTV	Provided		NPN
		UM-T50DT		D. J. ON	
	500mm	UM-T50DTV	Provided	Dark-ON Contact Takex for	
Through-beam type		UM-T50DS		Light-ON type.	Open collector
, , , , , , , , , , , , , , , , , , ,		UM-T50DSV	Provided		/ \
		UM-T100DT			
		UM-T100DS			Contact Takex for PNP-output
	2~30mm	UM-R3T			type.
11	Z ~ 30 iiiii	UM-R3TV	Provided	Light-ON	
Polarization reflector type	2~50mm	UM-R5T		Contact Takex for Dark-ON type.	
	2.300	UM-R5TV	Provided		
Diffuse-reflective type	5~30mm	UM-Z3SV	Provided		









Rating/Performance/Specification

	Ту	pe	UM- T15DT	UM- T15DTV	UM- T50DT	UM- T50DTV	UM- T50DS	UM- R3T	UM- R3TV	UM- R5T	UM- R5TV	UM- Z3SV
	Detection method			Thro	ugh-beam	type		Diffuse-reflective type Limited n			Limited reflection type	
	Detecting distance		150	mm	5	00mm (*1n	n)	2 - 30mm	*1	2 - 50	mm*1	5 - 30mm *1
JCe	Detection object			<i>φ</i> 3mı	m (Min.) O	paque						
mal	Power	supply	24	V DC ±10	% / Ripple	10% max.	*2	12	- 24V DC =	±10% / Rip	ple 10% m	nax.
rfor	Current	Transmitter			15mA max			20mA max.	27mA max.	20mA max.	27mA max.	27mA max.
)/pe	consumption	Receiver	15mA max.	22mA max.	15mA max.	22mA max.	15mA max.					
Rating/performance	Output	t mode		Rating	ı: sink curre	ent 80 mA (-	n collector nax. (PNF	output typ	e also avai	ilable.)	
	Operation	on mode			Dark-ON					Light-ON		
	Respon	se time					0.5ms	max.				
	Operatir	ng angle	angle 25°									
	Hyste	eresis						Up to 10% of detecting distance				
	_	source velength)	Red LED (660nm) (*Infrared LED)									
	Indicator		Operation indicator (red LED)—— For through-beam type, provided on receiver.									
	maic	mulcator		Stabi	lity indicate	or (green LI	ED)					
L	Volume			In-line sensitivity adjustment *3		In-line sensitivity adjustment *3	*4		In-line sensitivity adjustment *3		In-line sensitivity adjustment *3	In-line sensitivity adjustment *3
atio	Material	Case			Lie	quid crystal	line polyes	ter (filler: p	olypropyler	ne)		
oific	Matorial	Lens		Acrylic			ABS resin		Acrylic			ABS resin
Specification						nanently att		(outer dim	ension: dia	. 2.8)		
0)	Conn	ection			•	2 m length			0.15 sq. 3 d	core 2 m le	nath (black	,
		I			•	m length (l						,
	Mass	Transmitter				Approx. 30g		Approx. 30g	Approx. 40g	Approx. 30g	Approx. 40g	Approx. 40g
		Receiver				Approx. 40g		annoner '	10 VDC	huna alas s	voiloble	
	NI-	100			-	0x 50 mm work or and in-li		•				
	No	tes				sor and in-ii adjustment			eni volume	. SU CIII (TIX	eu)	
			4 Model	with in-inie	Sensitivity	aujustinetit	volume av	anabie				

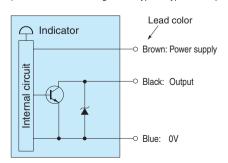
^{*}Models with detecting distance of 1 m are also available (infrared LED used as light source). For model numbers, see "Type."

Environmental Specification

Ħ	Ambient light	3,000 lx max.
nent	Ambient temperature	-25 - +55 -C (non-freezing)
Environn	Ambient humidity	35-85%RH (non-condensing)
n	Protective structure	IP64
Ш	Vibration	10 - 55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction

Input/Output Circuit and Connection

(Shows receiver of through-beam type as typical example. Power supply for reflective type: 12-24 VDC.)



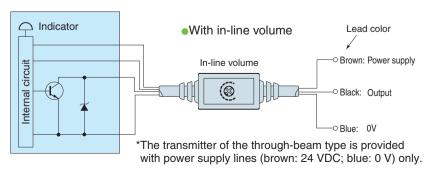
• Applicable power supply unit

PS series High capacity of 200 mA at 12 VDC (General-purpose type) PS3N

PS3N-SR

(Multifunctional type) PS3F

PS3F-SR

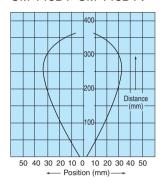


UM

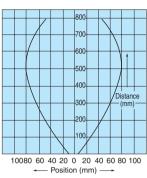
■ Characteristics (Typical Example)

Directional characteristics

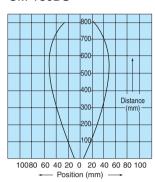
UM-T15DT·UM-T15DTV



UM-T50DT·UM-T50DTV

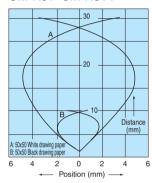


UM-T50DS

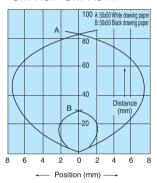


Activation area characteristics

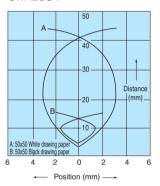
UM-R3T·UM-R3TV



UM-R5T·UM-R5TV

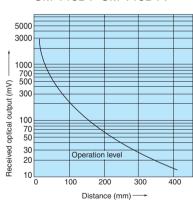


UM-Z3SV

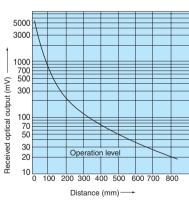


• Distance-area characteristics

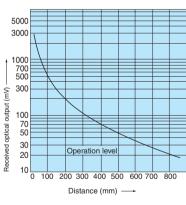
UM-T15DT·UM-T15DTV



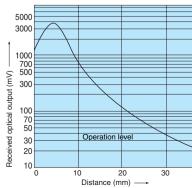
UM-T50DT·UM-T50DTV



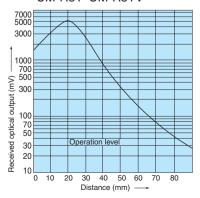
UM-T50DS



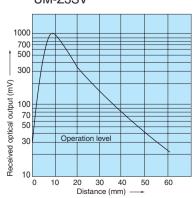
UM-R3T·UM-R3TV



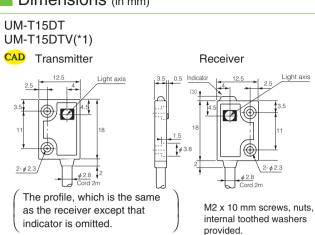
UM-R5T·UM-R5TV



UM-Z3SV



Dimensions (in mm)



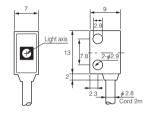
UM-T50DT·UM-T100DT UM-T50DTV(*1) **CAD** Transmitter Receiver Light axis The profile, which is the same M2 x 10 mm screws, nuts, as the receiver except that it internal toothed washers

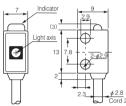
provided.

UM-T50DS UM-T100DS

CAD Transmitter





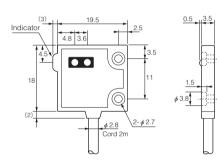


M2.6 x 12 mm screws, nuts, internal toothed washers provided.

UM-R3T UM-R3TV(*1)

has no indicator, is omitted.

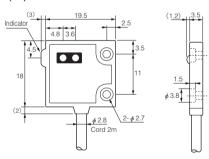




M2 x 10 mm screws, nuts, internal toothed washers provided.

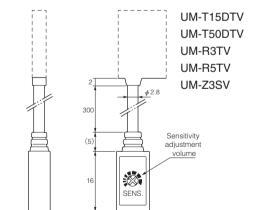
UM-R5T UM-R5TV(*1)





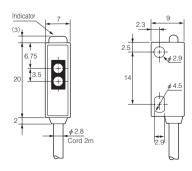
M2 x 10 mm screws, nuts, internal toothed washers provided.

(*1) Models identified by "V" at the end of the model number are equipped with a sensitivity adjustment volume. For through-beam type, the volume is provided in the receiver cord.



UM-Z3SV(%1)





M2.6 x 12 mm screws, nuts, internal toothed washers provided.

[•] Directly screw onto the surface for mounting. The tightening torque should not exceed 0.3 N·m. Mounting brackets are available as optional parts.





- Slim slide-on style sensor
- Basic function model for applications ranging from flush-mounting to small conveyor lines
- In-line sensitivity adjustment
 - <Sample application> detection of translucent objects Sensitivity adjustment allows detection of objects even if they do not completely block light.
 - <Sample application> detection of small objects
 Small object that blocks light axis but cannot be
 detected due to light going around it may be detected
 by adjusting sensitivity.

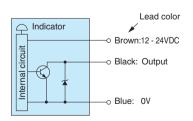
(Note) Be sure to test the operation before use.

Type

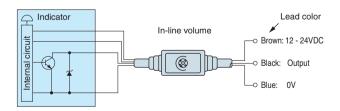
Detection method	Detecting distance	Model	In-line sensitivity adjustment volume	Operation mode	Output mode
		UM-T50DNS		Dark-ON	NPN Open collector
(1)	500mm	UM-T50DNSV	Provided	Daik-ON	
Through-beam type		UM-T50NS		Light-ON	
		UM-T50NSV	Provided	Light-ON	

Input/Output Circuit and Connection

Model: UM-TR50DNS UM-TR50NS



Model: UM-TR50DNSV UM-TR50NSV With in-line sensitivity adjustment volume



The transmitter of the through-beam type is provided with power supply lines (brown: 12~24 VDC; blue: 0 V) only.

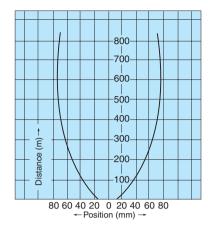


Rating/Performance/Specification

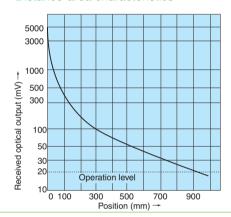
	Туре	Э	UM-T50DNS	UM-T50DNSV	UM-T50NS	UM-T50NSV	
	Detection i	method	Through-beam type				
	Detecting of	listance	500mm				
ce	Detection	object		φ 3mm (Mi	n.) Opaque		
Jan	Power si	112	12 - 2	4V DC ±10%	/ Ripple 10%	max.	
orn	Current	Transmitter		14mA			
erf	consumption	Receiver	14mA max.	22mA max.	14mA max.	22mA max.	
Rating/performance	Output n	node	Rating	NPN oper sink current 10		IC) max	
Rai	Operation	mode		c-ON		t-ON	
	Response			0.5ms			
	Operating	angle		13			
	Hystere						
	Light source (light wavelength)		Red LED (660nm)				
	Indicator		Operation indicator (red LED) Stability indicator (green LED)				
L	Volume			In-line sensitivity adjustment *		In-line sensitivity adjustment *	
atio	Marta Zal	Case	Polybutylene terephthalate				
ific	Material	Lens		Polya	rylate		
Specification	Connection		Permanently attached cord (outer dimension: dia. 2.8 Transmitter 0.15 sq. 2 core 2 m length (gray) Receiver 0.15 sq. 3 core 2 m length (black)			gth (gray)	
	Mass	Transmitter		Appro	x. 30g		
	IVIASS	Receiver	Approx. 35g	Approx. 40g	Approx. 35g	Approx. 40g	
	Note	s	* Length of cord bet	ween sensor and in-li	ne sensitivity adjustn	nent: 300 mm (fixed)	
ation	Ambient	light		3,000 l			
Decilic	Ambient tem			–25 - +55 − C (
Environment specification	Ambient h		3:	5 - 85%RH (no		g)	
ironm	Protective s			IP			
EN	Vibrati	on	10 - 55 Hz / 1.	5 mm amplitude	e / 2 hours eacl	n in 3 direction	

■ Characteristics (Typical Example)

Directional characteristics



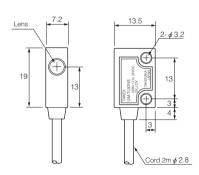
• Distance-area characteristics



Dimensions (in mm)

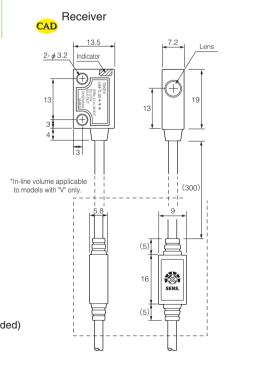
Transmitter





- No mounting bracket is provided.
- \bullet For mounting, use the screws provided. The tightening torque not exceed 0.3 N·m.

(M3 x 15 mm screws, nuts, two 3-piece sems screws provided)







- Ultra small size ideal embedded use
- IP 67 water resistance for wet environments
- Stability output is provided
- High-speed response of 0.35 ms
 - High-powered light penetrating business cards: GT1SN, GT1N
 - Long detecting distance of 10 m: GT3RSN
 - High-performance detection at shorter distance: GS5SN, GS5N
 - · Less affected by background: limited reflection type
 - Easy light axis alignment: red LED type

Type

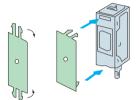
Detection method	Detecting distance	Model		Operation made	Output mode
Detection method	Detecting distance	Side-on type	Head-on type	Operation mode	Output mode
	1 m	GT1SN			
	1111		GT1N		
	7m		GT3N		
Through-beam type	10m	GT3RSN			
	7m	GT7SN			NPN Open collector
Reflector type	0.01~2m	GSM2RSN		Light-ON/	
	70mm	GS5SN		Dark-ON	
	7 011111		GS5N	selectable	
	400mm	GS20RSN		(with switch)	DND autout
Diffuse-reflective type	300mm		GS20RN		PNP output type also
	300mm	GS20SN			available
	200mm		GS20N		
\bigcirc	■1~40mm	GSZ3SN			
Limited reflection type	3 ~30mm	GSZ3RSN			

Optional Parts

Туре	Model	Pinhole diameter	Applicable model and detecting distance (attached to both transmitter and receiver)	
	GP1	φ 1mm	GT3RSN400mm	
	GI I	Ψ ΠΠΠ	GT7SN300mm	Two plates required
	GP2	φ 2mm	GT3RSN ······1m	
Pinhole plate	GFZ	φΖιιιιι	GT7SN 1m	Two plates required
(SUS)	GP3	4 2mm	GT3RSN 3m	for attaching to both
	GF3	<i>φ</i> 3mm	GT7SN 2.5m	transmitter and
	GP5-1	E v 1mm	GT3RSN 2m	receiver.
	GP5-1 5 x 1mm	5 X IIIIIII	GT7SN1.7m	

(Models GT1N is provided with stick-on pinhole sheets.)

Attachment of pinhole plate



Manually bend the top and bottom parts at the base and insert the bent parts into the sensor slits.

Protective cover	G-MSB1	Applicable to	Rigid SUS covers for
	G-MTB1	side-on type	protecting sensors and reflectors from impact, etc.
	G-K7B	Applicable to K-7 and K-71 reflectors	See p. 211 for details.

Applicable power supply unit

PS series High capacity of 200 mA at 12 VDC



(General-purpose type) PS3N

PS3N-SR

(Multifunctional type)

PS3F PS3F-SR

■ Rating/Performance/Specification

		Side-on	GT1SN	·	GT3RSN	GT7SN	GSM2RSN	GS5SN	GS20RSN	GS20SN	GSZ3SN	GSZ3RSN
	Туре	Head-on	GT1N	GT3N				GS5N	GS20RN	GS20N		
	Detection		arm		l beam type		Reflective type		se-reflective		Limited refl	oction type
	Detecting		1m	7m	10m	7m	0.01~2m*	70mm	400mm	300mm (GS20SN) 200mm	1~40mm	
0	Detectio	n object	-	ϕ 6mm (Mi	n.) Opaque)		50 x 50 mm white drawing paper	white o	00 mm Irawing per		
ance	Power	supply				24V D	C ±10%/	Ripple 109	6 max.			
Rating/performance	Current co	nsumption	Transmitter: Receiver: 1		Transmitter: 20mA max. Receiver: 18 mA max.		20mA max.	25mA max.	20mA max.	22mA	max.	20mA max.
Rating/p	Output	Control	Ra	ating: sink	ollector out current 100	mA (30 VI	DC) max.	(PNP outp	out type als	o available)	
	mode	Stability output		•	ollector out current 50	•	C) max. (PNP outpu	t type does	not have s	tability outp	out)
	Operation	on mode			Light-0	ON/Dark-O	N selectab	N selectable (with switch)				
	Respon	se time		0.35ms max.								
	Hysteresis									10% max.		
	Operatir	ng angle	30° (at receiver)	10	° (at receiv	er)	30° (at reflector)					
	Light source (light wavelength)		Infrare (880		Red LED (700nm)	Infrared LED (880nm)	Red LED (700nm)	Red LED (900nm)	Red LED (700nm)	Red LED (900nm)	Red LED (900nm)	Red LED (700nm)
	Indic	ator	Transmitter: Power indicator (red LED) Receiver: Operation indicator (red LED) Stability indicator (green LED) Operation indicator (red LED) Stability indicator (green LED)									
	Volu	ıme	SENS: Sensitivity adjustment (on receiver for through-beam type)									
c	Swi	itch	Light-ON/I L.ON side-				-Light-ON /	-ON selector switch provided ht-ON / D.ON side Dark-ON I-on type, on the back for side-on type				
atio	Short circui	t protection				Provi	ded (for co	ntrol output	only)			
Specification	Material	Case					Polya	-	<u> </u>		[
Spe		Lens	Polycarbonate		Polyarylate)	Polycai	rbonate	Polya	rylate	Polycarbonate	Acrylic
	Connection Permanently attached cord (Transmitter) 0.15 sq. 2 (Receiver) 0.15 sq. 4 c			2 core 2 m length (gray)		manently attached cord (outer dimension: dia. 3) 0.15 sq. 4 core 2 m length(black)			a. 3)			
	Ma	ISS	Abou	t 50 g (tran	smitter/rec	eiver)			Appro	x. 50g		
	No	tes	(Pair of) pinhole sheets provided (only GT1N)		opti	e plates onal	*When used v K-71 reflect provided	or				
		_	al Casa	161 .1		Mounting br	acket, ope	ration man	ual provide	d		

Environmental Specification

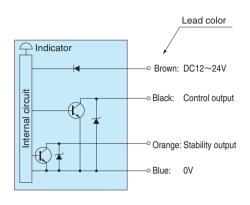
	Ambient light	5,000 lx max.
	Ambient temperature	-25 - +55 -C (non-freezing)
ent	Ambient humidity	35~85%RH (non-condensing)
ПП	Protective structure	IP67
Environment	Vibration	10~55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction
	Shock	500 m/s2 / 3 times each in 3 directions
_	Dielectric strength	1,000 VAC for 1 minute
	Insulation resistance	500 VDC, 20 MΩ or higher

* Detecting distances for different reflectors

The detecting distance depends on the reflector used.

Reflector model	K-71	K-7	S-25	
Detecting distance	0.01 - 2m	0.01 - 3m	70 - 400mm	

Input/Output Circuit and Connection

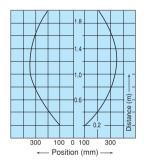


- The transmitter is provided with power supply lines (brown: 12 -24 VDC; blue: 0 V) only.
- The output transistor turns off when load short circuit or overload occurs.
 - Check the load and turn the power back on.

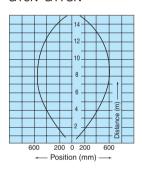
Characteristics (Typical Example)

Directional characteristics

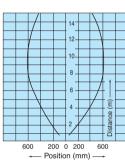
GT1SN·GT1N



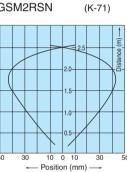
GT3N·GT7SN



GT3RSN

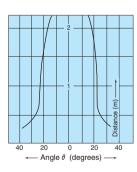


GSM2RSN

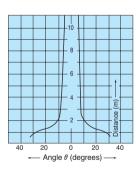


Operating angle characteristics

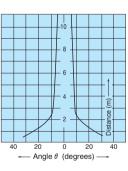
GT1SN·GT1N



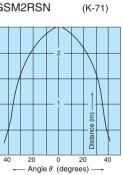
GT3N·GT7SN



GT3RSN

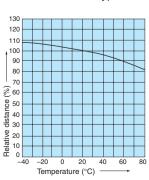


GSM2RSN

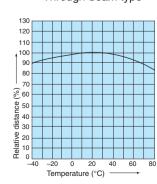


Temperature characteristics

Reflective type



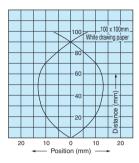
Through-beam type



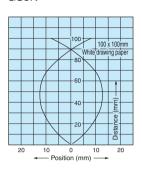
193

Activation area characteristics

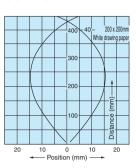




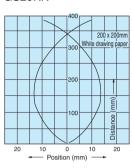
GS5N



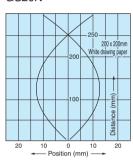
GS20RSN



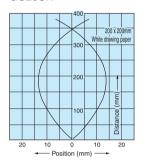
GS20RN



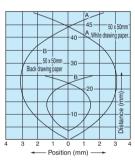
GS20N



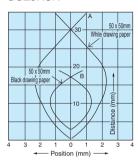
GS20SN



GSZ3SN

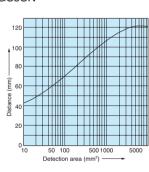


GSZ3RSN

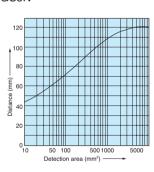


• Distance-area characteristics

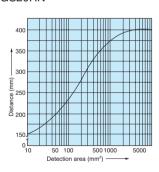
GS5SN



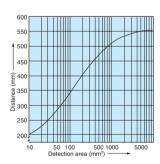
GS5N



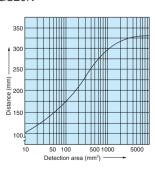
GS20RN



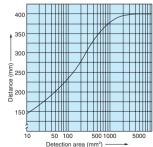
GS20RSN



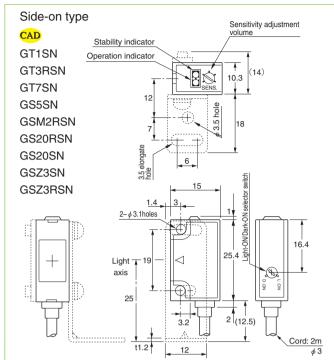
GS20N



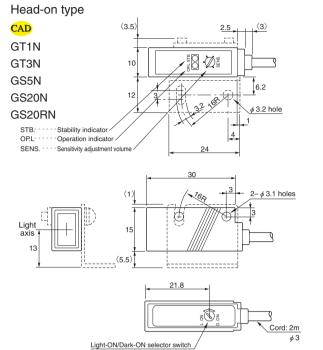
GS20SN

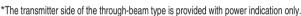


Dimensions (in mm; tightening torque for mounting screws: 0.6 N⋅m max.)





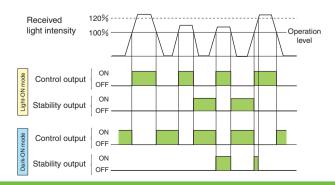




Reflector CAD K71 Applicable to polarization reflector type Effective reflecting surface: 19 x 32 mm Mounting: mounting bracket provided, secured with M3 screws (alternatively adhesive may be used)

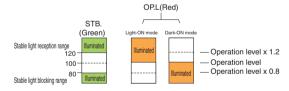
Stability output

The stability output can be used to check for reduction of the light intensity level along with any change in the operating environment or operation over time or to perform initial check of the operation. When two consecutive detections have occurred with the intensity of light detected exceeding the operation level but not reaching 120 % of the level (range allowing stable operation), the stability signal is output when the control output is deactivated. (This output is not available with the PNP output types of the Mini-G Series.)



Indicators

- The operation indicator (red LED) and stability indicator (green LED) show the levels of light intensity as described in the figure below.
- After aligning the optical axis and adjusting the sensitivity, use a
 detection object to block and unblock the light beam several times to
 make sure that the sensitivity level is in a range that allows stable
 activation and deactivation.
- Setting the sensitivity in a range allowing stable operation achieves higher reliability against changes in the operating environment generated after the sensitivity is set.



The orange LED (OP.L) is the operation indicator.

In the L.ON (Light-ON) mode, the indicator is illuminated when a certain amount of light is detected.

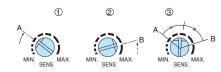
In the D.ON (Dark-ON) mode, the indicator is illuminated when a certain amount of light is not detected.

Sensitivity adjustment (for Light-ON mode)

(Adjustment for Light-ON mode)

• When any light-reflecting object is in the background

- (1) Place the object to be detected in a given position, turn up the sensitivity adjustment volume (SENS.) gradually and find the point at which the operation indicator (red LED) is illuminated (Point A).
- (2) Remove the object, turn down the sensitivity adjustment volume gradually from MAX. and find the point at which the operation indicator (red LED) goes out (Point B). (If the operation indicator is not illuminated even at Max., MAX. is regarded as Point B.)
- (3) Set the volume at midway between Points A and B.





- World's first 2D sensing utilizing the BGS method
- Size (area/presence), number and position of object detected with compound eye utilizing a pulsating light and 3072 points of reference
- Reflective sensor using a new system integrating transmitter / receiver amplifier and monitor function in one unit
- Anti-Interference feature

Type

	Detection method	Detecting distance	Model	Operation mode	Output mode	
	Compound eye detection	80~200mm	VS-S20R			
			VS-S20B	Judgment	NPN open collector	
		100~500mm	VS-S50RNF			
			VS-S50BNF			

Optional Parts

Туре	Model	Description
Special mounting bracket	DX-B1	H-shaped (for face mounting)
	DX-B2	L-shaped (for side mounting)

BGS method

Unique pulsating light emission employed for less influence of background and increased stability against disturbing light.

MSR feature

Provided with a feature to minimize the effect of mirror surface (VS-S20R, VS-S20B) for accurate object detection

Long distance/wide field of view

Wide detection field with a detecting area of 250 x 180 mm at a distance of 500 mm (VS-S50RNF, VS-S50BNF; MSR feature not provided).

Anti-Interference feature

Anti-interference detection feature in master/slave mode is available for use of two sensors installed in parallel or face-to-face.

■ Rating/Performance/Specification

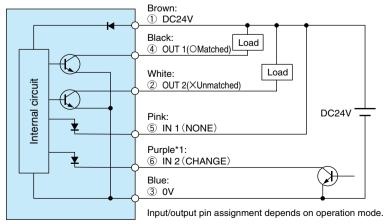
	Туре	VS-S20R/VS-S20B%2	VS-S50RNF/VS-S50BNF%2				
	Detecting distance	80 - 200mm	100 - 500mm				
ool	Detecting area (field of view)	100 (H) x 75 (V) mm at 200 mm	250 (H) x 180 (V) mm at 500 mm				
	Detecting resolution	Total number of points in detecting a	rea (field of view) 3072 point = 64 (H) x 48 (V)				
mar	Minimum detectable object	ϕ 1 mm (at detecting distance of 200 mm, 2 x zoom)					
rfor	Power supply	24V DC ±10% / Ripple 10% max.					
g/pe	Current consumption	300mA	A max.				
0Rating/performance	Output	2 NPN open col	lector 2 outputs				
9 R	σαιραί	Sink current 50 mA (30 VDC) m	ax. Residual voltage: 2 V max.				
	Input	2 inputs					
	mput	Rating: 5mA 24VDC					
	Response time	25 ms max. in Continuous mode and at shutter speed 240					
	Mirror surface rejection	Provided	Not provided				
	Light source (wavelength)	Red LED (639nm) Blue LED (466nm) *2					
_	Light-sensitive element	2D photo diode array					
Specification	Indicator	LCD display					
ific	Operating switch	3 pushbutton switches for UP, DOWN, ENTER					
Spec	Material	Body: aluminum / Lens: acrylic / Front/rear panel: ABS					
0)	Connection	6-pin waterproof plastic connector connection					
	Mass	Approx. 250g					
	Accessory	Cord with connector *1, operation manual					

^{*1: 0.2} mm2 x 6 / 2 m (outer diameter: 5 mm)

Environmental Specification

	Ambient light	1,000 lx max. (on light receiving surface)
	Ambient temperature	-10 - +45 -C (non-freezing)
aut	Ambient humidity	35 - 85%RH (non-condensing)
Environment	Protective structure	IP65
viro	Vibration	10 - 55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction
ᇤ	Shock	500 m/s² / 3 times each in 3 directions
	Dielectric strength	1,000 VAC 50/60Hz for 1 minute
	Insulation resistance	500 VDC, 20 MΩ or higher

Input/Output Circuit and Sample Connection (in Continuous mode)



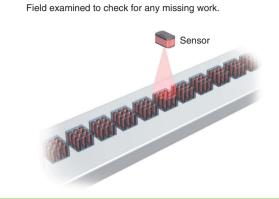
^{*1} Connect unused purple line (6) IN2 (CHANGE) to 24 VDC.

^{*2:} Blue light source

VS

Sample Applications

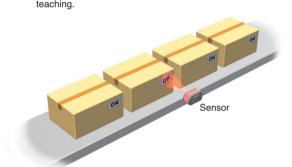
Checking of quantity in field of view



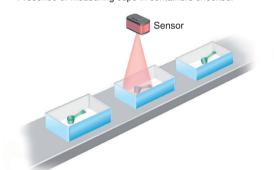
Work area judgment
 Field examined to check for nonstandard size.

Sensor

Detection of label at specified position
 Presence of label at specified position checked by XY coordinate togething

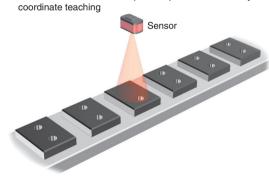


Detection of parts in containers
 Presence of measuring cups in containers checked.



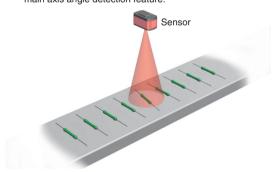
Detection of hole at specified position

Presence of bored hole at specified position checked by XY

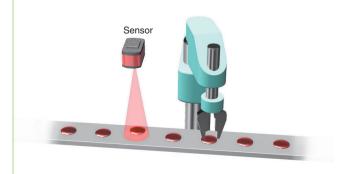


Checking for angular displacement

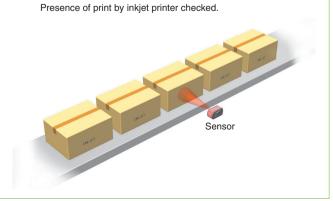
Angular displacement of parts, etc. arranged in parallel checked by main axis angle detection feature.



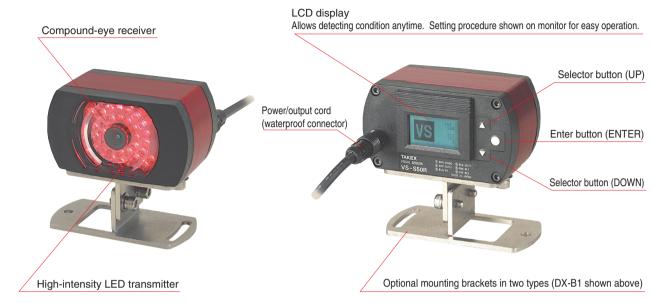
Checking of position in detecting area
 Position of work checked during picking by robot.



Detection of presence in detecting area



Appearance and Part Names

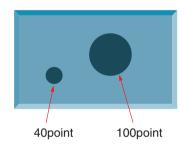


Detection/Judgment Feature

Detection of size (area/presence)

Applications

- Detection of nonstandard shape, etc.
- Checking of presence of print, label, etc.

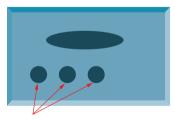


Two or more (up to 100) objects in the field can be individually detected to determine size, which allows the detection of a particular object alone by setting the upper and lower limits of the size (area). Presence can also be checked.

Determination of count

Applications

- Checking of package for smaller number of objects than specified
- Checking of connector lead count



3 detection objects of 40 points in size

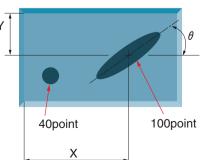
Two or more (up to 100) objects in the field can be individually detected for size determination, this provides determination of the number of detection objects of a given size as:

- Larger than the setting,
- ●Equal to the setting, or
- Smaller than the setting.

Checking of position

Applications

- Checking for displaced stickers
- Checking for wrong type mixed in



Two or more (up to 100) objects in the field can be individually detected for size determination, which therefore allows the user to determine the position of one detected object of a given size by:

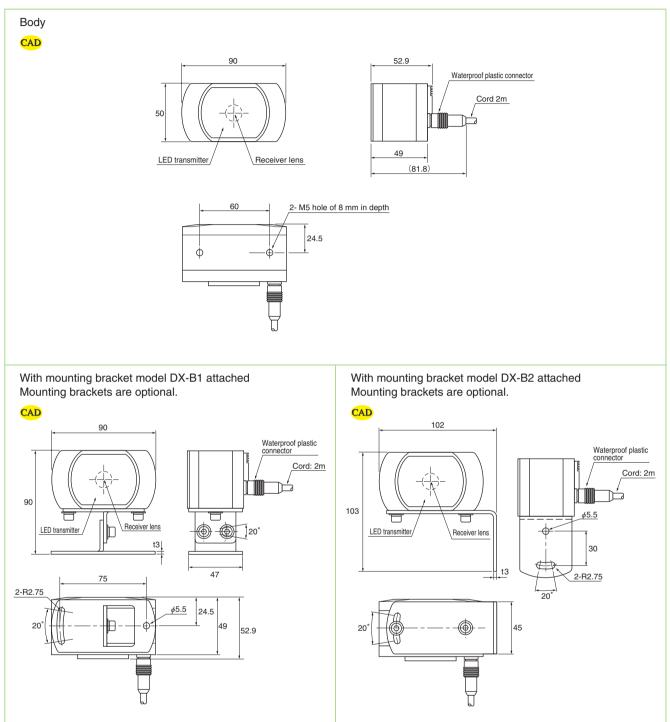
- X-coordinate of the center of gravity,
- Y-coordinate of the center of gravity, and
- $lue{}$ Inclination (θ).

VS

■ Judgment Output Timing Chart

Operation mode	Input/output setting	Operation timing chart
Continuous/Self		NG judgment OK judgment OK judgment
synchronization mode	OUT1:OK	ON OFF
	OUT2 : NG	ON OFF
		First RUN Second RUN Third RUN Fourth RUN
External	IN1: TRIGGER	ON OFF
synchronization mode If a TRIGGER signal is input while the		OK judgment NG judgment
READY output is active, a RUN is started. The READY output is deactivated	OUT1: OK/NG	ON OFF
during a RUN. The output mode factory setting is OK, which means that the signal is output	OUT2: READY	ON OFF
when the detection is judged OK.		First RUN Second RUN
External	IN1: TRIGGER	ON OFF
synchronization mode		OK judgment NG judgment
When NG is selected as the output mode, the signal is output when the detection is judged NG.	OUT1: OK/NG	ON OFF
	OUT2: READY	ON OFF
		First RUN Second RUN

Dimensions (in mm)







- Simple operation of just pressing button
 One large button alone handling sensitivity adjustment and Light-ON/Dark-ON switching
- Sensitivity adjustment not requiring placing of work

Simple sensitivity adjustment without placement of work for detection in narrow spaces or of falling objects that cannot be easily stopped

Equipped with inverter light suppression circuit

Faulty operation under inverter fluorescent lamps prevented

IP 67 water resistance allows washing
 Reliable use even in sites subject to water or high moisture

Type

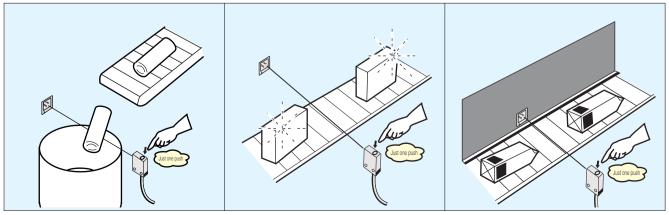
Detection method		Detecting distance	Model		Operation mode	Output mode	
Detection meti	ilou	Detecting distance	NPN type PNP type		Operation mode	Output mode	
Polarization reflector	r type	0.1 - 3m	GA-M3R	GA-M3RPN	Light-ON/ Dark-ON	Open collector	
Diffuse-reflective	type	500mm	GA-S05R	GA-S05RPN	(by teaching)		

Optional Parts

Product name	Model	Description		
Polarization reflector	K-7	Dimensions: 60 x 40 mm / Detecting distance: 0.1 - 3 m		
FUIdIIZatiuii Tellectui	K-71	Dimensions: 35 x 23 mm / Detecting distance: 0.1 - 1.8 m		
Mounting bracket	GA-B1	Vertical mounting bracket		
wounting bracket	GA-B2	Horizontal mounting bracket		
	G-MSB1	Digid protective cover doubling as		
Protective cover	G-MTB1	Rigid protective cover doubling as mounting bracket. See p. 211.		
	G-K7B	mounting bracket. See p. 211.		

Polarization reflectors and mounting brackets do not come with sensors. Select and purchase appropriate models according to the detecting and mounting conditions.

Sample Applications



■ Rating/Performance/Specification

	Tv	20	NPN type	GA-M3R	GA-S05R								
	Type		PNP type	GA-M3RPN	GA-S05RPN								
	Detection method			Polarization reflector type	Diffuse-reflective type								
	Doto	ctino	distance	0.1 - 3 m	500mm								
	Dete	Curig	distance	(With K-7 reflector)	(Standard detection object: 200 x 200 mm white drawing paper)								
JCe	Po	ower	supply	12-24V DC ±10%	/ Ripple 10% max.								
ormai	Curi	rent	NPN type	30m <i>A</i>	ı max.								
/perfc	consur	nption	PNP type	30mA	n max.								
Rating/performance	Ф	output	output	NPN type		ector output C) max. / Residual voltage: 1 V or less							
ш	Output mode	Control	mod	Control	Control	Control	Control	Control	Control	Control	PNP type	Open colle	ector output C) max. / Residual voltage: 1 V or less *
		output	utput output	NPN type	Open colle	ector output max. / Residual voltage: 1 V or less *							
		Stability	PNP type	Open colle	ector output 3) max. / Residual voltage: 1 V or less *								
	Operation mode		on mode	Light-ON/Dark-ON selectable									
	Re	spon	se time	1ms max.									
	L	ight s	source	Red LED (700nm)	Red LED (644nm)								
		India	cator	Operation indicator (orange LED	or (orange LED) Stability indicator (green LED)								
_	Se	etting	button	For sensitivity adjustment and	Light-ON/Dark-ON switching								
Specification	Short	circui	it protection	Prov	rided								
oific		Mat	erial	Case: polyarylate	Case: polycarbonate								
Spec		iviat	Cilai	Lens: acrylic	Lens: acrylic								
0)	C	Conn	ection	Permanently attached cord (outer dimens	ion: dia. 4.2mm) 0.2 sq. 4 core 2 m length								
		Ma	ass	Body: about 60 g									
	Accessory		ssory	Operation manual, explanation sticker (Note: reflector and mounting bracket separately available)									

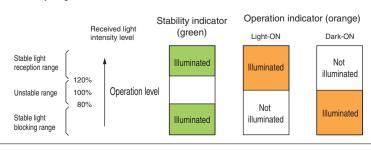
^{*} The residual voltage of GA-M3R (PN) is 2 V max.

Environmental Specification

			ı
		Ambient light	5,000 lx max.
Environment		Ambient temperature	-25 - +55 -C (non-freezing)
	ent	Ambient humidity	35~85%RH (non-condensing)
	nm	Protective structure	IP67
	viro	Vibration	10 - 55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction
	Ē	Shock	500 m/s2 / 3 times each in 3 directions
		Dielectric strength	1,000 VAC for 1 minute
		Insulation resistance	500 VDC, 20 MΩ or higher

Indicators

The figure below shows the illumination of operation and stability indicators for different received light intensity levels. Set the sensitivity in such a way that the sensor operates in a sensitivity range that allows stable activation.



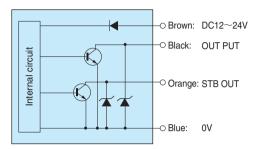
Stability output

When seven consecutive detections have occurred with the intensity of light detected not reaching the range allowing stable operation, the stability signal is output.

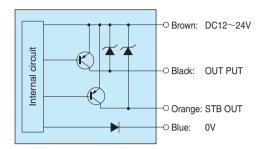
GA

Input/Output Circuit and Connection

NPN output GA-M3R GA-S05R



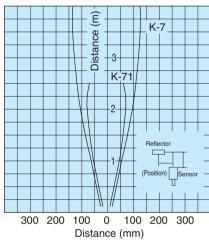
PNP output GA-M3RPN GA-S05RPN



Characteristics (Typical Example)

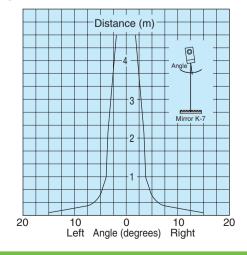
Directional characteristics

GA-M3R GA-M3RPN



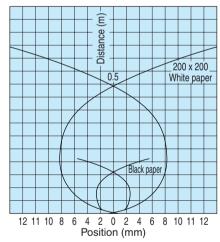
Operating angle characteristics

GA-M3R GA-M3RPN



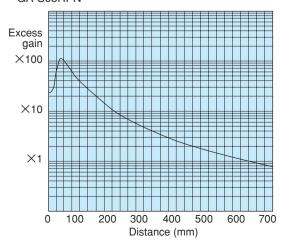
Activation area characteristics

GA-S05R GA-S05RPN



• Distance-output characteristics

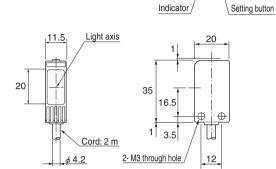
GA-S05R GA-S05RPN



Dimensions (in mm)

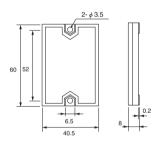
Sensor body GA-M3R GA-M3RPN GA-S05R GA-S05RPN





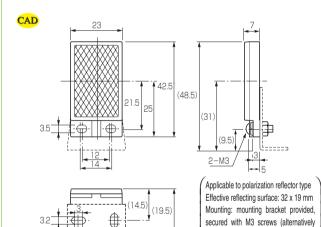
Polarization reflector K-7





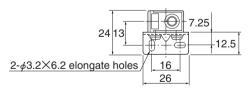
Applicable to polarization reflector type Effective reflecting surface: 56 x 36 mm Mounting: secured with M3 screws (alternatively adhesive may be used) Protective structure: IP 67

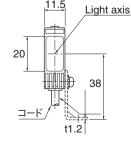
Polarization reflector K-71

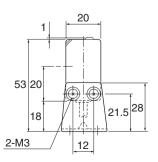


With separately available mounting bracket (GA-B1) attached





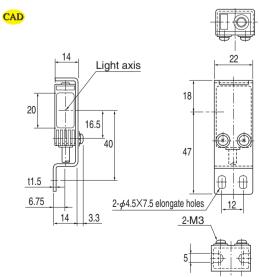




With separately available mounting bracket (GA-B2) attached

Mounting bracket (Fe: t = 1.2)

adhesive may be used)



GA-M3R GA-M3RPN

For Correct Use

Be sure to follow the instructions in the operation manual provided for correct use of the product.

Part names



This sensor only has one setting button and no sensitivity adjustment volume or selector switch. Light-ON/Dark-ON switching and sensitivity setting are handled with the setting button alone.

Enter the sensitivity setting mode or Light-ON/Dark-ON switching mode by pressing and holding down the button for a period of time as specified below:

Hold down setting button for 2 - 4 seconds

⇒ Sensitivity setting mode

Hold down setting button for 5 seconds or longer

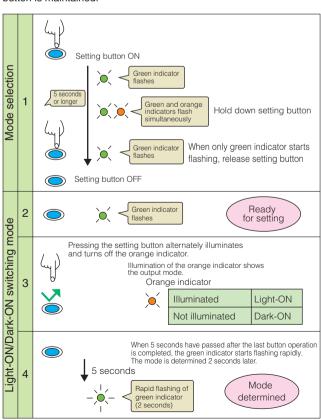
⇒ Light-ON/Dark-ON switching mode

Switching between Light-ON/Dark-ON mode

The factory setting is Dark-ON mode.

Be sure to check and set either the Light-ON or Dark-ON mode before setting the sensitivity.

Enter the Light-ON/Dark-ON switching mode by pressing the setting button for 5 seconds or longer. While the button is operated, the state of the output before starting the operation of the button is maintained.



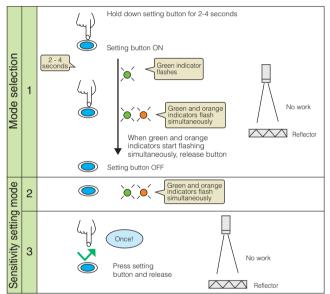
Sensitivity setting

The factory setting is maximum sensitivity. No special sensitivity adjustment is required if the detection object is something that completely blocks the light such as corrugated cardboard box. Adjust the sensitivity as required according to the state of the detection object or sensor mounting condition. Use the table below as guidelines:

Detection object	Sensitivity setting
Translucent object such as milky white plastic case -	Single-touch teaching
Continuously moving object such as falling object -	Full auto teaching
Object that completely blocks light such as corrugated cardboard box	Maximum sensitivity setting

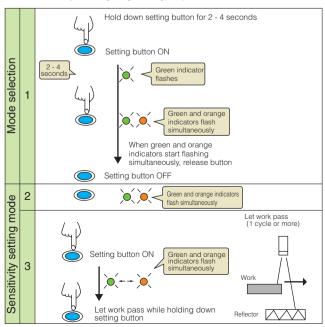
Single-touch teaching —Auto teaching—

No work needs to be placed. Set the sensitivity while the light is received. Just a single operation of the button sets the optimum sensitivity for the given received light intensity.



Full auto teaching

When it is not possible to make "no-work" state as in detection of continuously moving (e.g. falling) object



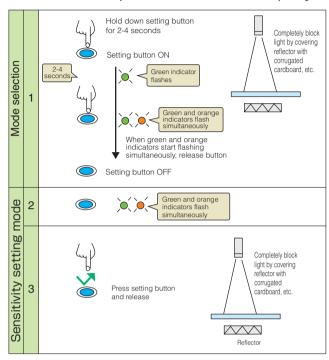
GA-M3R GA-M3RPN

For Correct Use

Be sure to follow the instructions in the operation manual provided for correct use of the product.

Maximum sensitivity setting

Enter the sensitivity setting mode with the light blocked and press the setting button once. The sensitivity is set at the maximum, which is the factory setting.



Installation

- Polarization reflectors and mounting brackets do not come with sensors. Purchase appropriate reflectors and mounting brackets according to the application.
- Sensor mounting

The mounting holes in the sensor are M3 threaded. Select M3 screws of an appropriate length so that the screw-in length to the body of the sensor will be at least 10 mm.

The tightening torque should be up to 0.5 N·m.

If the effective length of the screw to the sensor is too short, the thread of the sensor may be damaged.

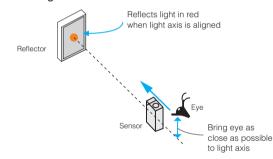
 Secure the sensor on a solid base.
 Inadequate securing allowing the sensor to move when the setting button is pressed hampers accurate sensitivity setting.
 Be sure to firmly secure the sensor.

Make sure that the sensor and reflector are fixed before use. If the sensor or reflector is allowed to move, the operation may become unstable.

Rotation of the reflector with reference to the sensor is especially likely to cause problems such as chattering.

 If the ambient temperature is low enough for freezing to occur, the operation of the setting button may not feel smooth. In such a case, press hard until the indicator flashes.

Light axis alignment



Place the reflector and sensor face-to-face and look towards the reflector from right behind the sensor.

Adjust the mounting of the sensor so that the light is reflected on the reflector in red.

For accurate alignment, try to look from as close to the sensor light axis as possible.

GA-S05R GA-S05RPN

For Correct Use

Be sure to follow the instructions in the operation manual provided for correct use of the product.

Part names



This sensor only has one setting button and no sensitivity adjustment volume or selector switch. Light-ON/Dark-ON switching and sensitivity setting are handled with the setting button alone.

Enter the sensitivity setting mode or Light-ON/Dark-ON switching mode by pressing and holding down the button for a period of time as specified below:

Hold down setting button for 2 - 4 seconds

⇒ Sensitivity setting mode

Hold down setting button for 5 seconds or longer

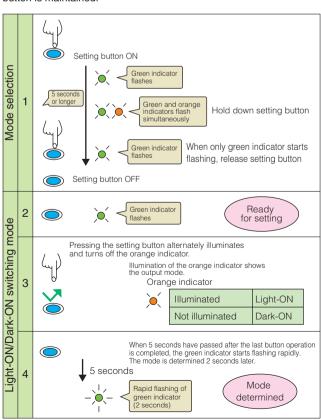
⇒ Light-ON/Dark-ON switching mode

Switching between Light-ON/Dark-ON mode

The factory setting is Dark-ON mode.

Be sure to check and set either the Light-ON or Dark-ON mode before setting the sensitivity.

Enter the Light-ON/Dark-ON switching mode by pressing the setting button for 5 seconds or longer. While the button is operated, the state of the output before starting the operation of the button is maintained.



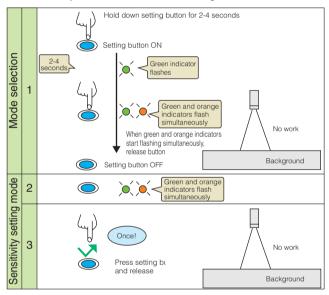
Sensitivity setting

The factory setting is maximum sensitivity. No special sensitivity adjustment is required if there is no background object in the direction of the detection. Adjust the sensitivity as required depending on whether there is any background object such as a wall or conveyor and according to the state of the detection object or sensor mounting condition. Use the table below as guidelines:

Detection object	Sensitivity setting
With background object such as wall	Single-touch teaching
Continuously moving object such as falling object	Full auto teaching

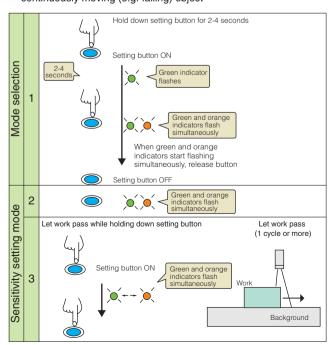
Single-touch teaching —Auto teaching—

No work needs to be placed. Just a single operation of the button sets the optimum sensitivity for the given received light intensity even an object such as wall is in the background.



Full auto teaching

When it is not possible to make Xno-workt state as in detection of continuously moving (e.g. falling) object



GA-S05R GA-S05RPN

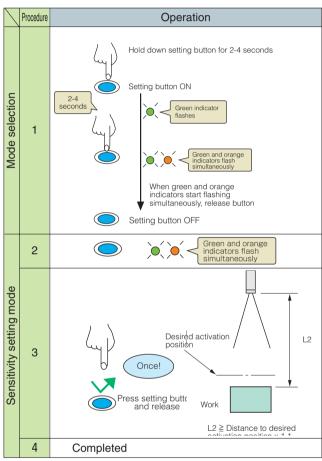
For Correct Use

Be sure to follow the instructions in the operation manual provided for correct use of the product.

Arbitrary activation position setting

To set the detection point of the sensor at an arbitrary position Place the work at a point about 90 % of the distance to the desired activation position and select the sensitivity setting mode.

Move the work to a point about 110 % of the distance to the desired activation position and press the setting button once.



Although shorter distance between L1 and L2 allows more precise setting, too short a distance makes the setting similar to the single-touch teaching with only the background taken into account

Try to make the difference between L1 and L2 at least $\pm 10\,\%$ of the distance to the desired activation position whenever possible.

Installation

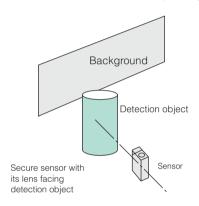
- No mounting bracket is provided. Purchase mounting brackets separately available according to the application.
- Sensor mounting

The mounting holes in the sensor are M3 threaded. Select M3 screws of an appropriate length so that the screw-in length to the body of the sensor will be at least 10 mm.

The tightening torque should be up to 0.5 N·m.

If the effective length of the screw to the sensor is too short, the thread of the sensor may be damaged.

 Secure the sensor firmly on a solid base so that the sensor will not move when the setting button is pressed.
 Inadequate securing allowing the sensor to move when the setting button is pressed hampers accurate sensitivity setting.

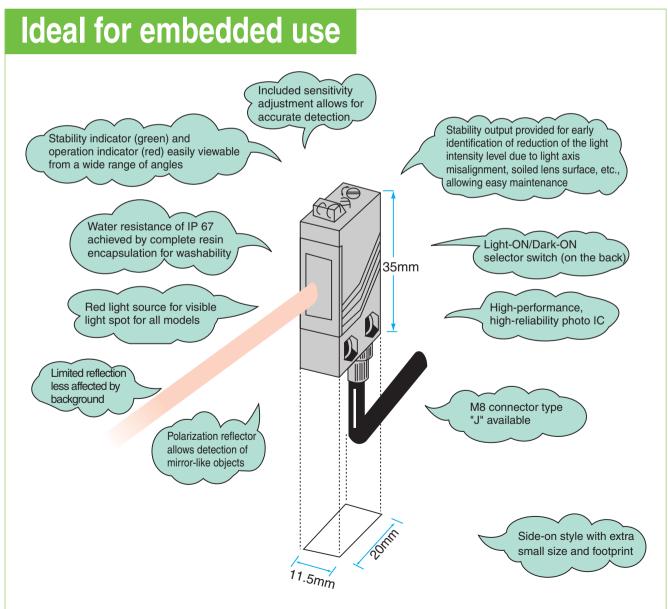


 If the ambient temperature is low enough for freezing to occur, the operation of the setting button may not feel smooth. In such a case, press hard until the indicator flashes.

Middle-Gseries Embedded Amplifier Photo Sensors



- IP 67 water resistance
- Detects mirror-like materials (mirrors, glossy objects) (polarization reflector type)
 - Switch selectable operation mode
 - Sensitivity adjustment for fine detection
 - Globally compatible PNP types also conveniently provided with stability output
 - Optional rigid protective cover (mounting bracket) available



Туре

Detection method	Detecting distance	Мо	Model		Output mode
Detection method	Detecting distance	Side-on type	Head-on type	Operation mode	Output mode
		GT5RSN			
Through-beam type	7m	GT5RSN-J			
i i i i ough-beain type	7111		GT5RN		
			GT5RN-J		
		GMR2RSN			
Polarization	0.03 -1.5m	GMR2RSN-J		Light-ON/ Dark-ON selectable with switch	NPN open collector PNP output type also available
reflector type			GMR2RN		
			GMR2RN-J		
	500mm	GSR05RSN			
Diffuse-reflective type		GSR05RSN-J			
Dilluse-reliective type			GSR05RN		
			GSR05RN-J		
_		GSZ5RS			
	0050	GSZ5RS-J			
Limited reflection type	20~50mm		GSZ5R		
			GSZ5R-J		

PNP output type

PNP output types are available for all models.

PNP output type models are identified by "PN" at the end of model number.

The rating/performance other than the output is the same as NPN type.

Optional Parts

Туре	Model	Applicable model	Description	
Reflector	K-7	All polarization	Detecting distance With K-7: 0.03-2.5 m	
nellector	S-25 *	reflector type models	With S-25: 70-400 mm	
	G-MSB1	Side-on type models		
Protective cover	G-MTB1	Side-on type models	Rigid SUS covers for protecting sensors and	
FIOLECTIVE COVE	G-MTB2	Head-on type models	reflectors from impact, etc.	
	G-K7B	K-7 and K-71 reflectors		
Cord with M8	FBC-4R2S	M8 connector	Straight (2 m)	
connector	FBC-4R2L	type sensor models with "-J"	Angled (2 m)	

^{*} One sheet contains 25.

Protective cover

G-MSB1 (For side-on style)



G-MTB1

(For side-on style)

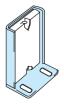


G-MTB2

(For head-on style)



G-K7B (For reflector)



For dimensions, see "Dimensions (protective cover)."

■ Rating/Performance/Specification

	Madal	Side-on	GT5RSN	GMR2RSN	GSR05RSN	GSZ5RS		
	Model	Head-on	GT5RN	GMR2RN	GSR05RN	GSZ5R		
	Detection metho		Through-beam type	Polarization reflector type	Diffuse-reflective type	Limited reflection type		
	Detecting	distance	7m	0.03 - 1.5m*	500mm	20 - 50mm		
	Detection object		φ 20mm (Min.) Opaque	Glossy objects including mirror-like materials and stainless-steel plates or opaque objects Standard detection object: 100 x 100mm white drawing paper				
Se Se	Power	supply	12	- 24V DC ±10% / Ripple 10	0% max. (*15 V power supp	ly)		
Rating/performance	Current co	nsumption	Transmitter: 20 mA max. Receiver: 20 mA max.	30mA max.				
/per		Control	NPN open collector	output				
ting	Output	output	Rating: sink current	100 mA (30 V DC) max.	(PNP output type	also available)		
Ra	mode	Stability	NPN open collector	output				
		output	Rating: sink current	50 mA (30 V DC) max.	(PNP output type	also available)		
	Operation mode			Light-ON/Dark-ON selectable (with switch)				
	Respon	se time	0.5ms max.					
	Hysteresis ————		10% max.		max.			
	Operating angle		10° (at receiver)	30° (reflector) —————				
	Light source (light wavelength)		Red LED (700nm)					
			Transmitter: power indicator (red LED)		noration indicator (red LEC	,,		
	Indic	ator	Receiver: operation indicator (red LED)	Operation indicator (red LED) Stability indicator (green LED)				
			Stability indicator (green LED)	Ctability indicator (green EED)				
	Volu	ıme	SENS	S: sensitivity adjustment (or	receiver for through-beam	type)		
	Swi	tch		Light-ON/Dark-ON se	· · · · · · · · · · · · · · · · · · ·			
	Short circui	t protection	Pro	ovided (for control output or	nly)	Provided		
ion	Material	Case		Polya	rylate			
Specification	Matorial	Lens		Acr	ylic			
ecil				Permanently attached cord	(outer dimension: dia. 4.2)			
ß	Conne	ection	Transmitter of through-beam type: 0.3 sq. 2 core 2 m length(gray)					
			R	eceiver of through-beam ty	pe: 0.2 sq. 4 core 2 m (blac	k)		
	Ma	ISS	About 80 g (transmitter/receiver)		About 80g			
				K-71 reflector provided				
				Screwdriv	er for sensitivity adjustment	t provided		
*1 Contact Takex for 5 VDC power supply models available for head-on types. • All models are provided with a mounting bracket. Polarization reflector types are provided with for reflector and adhesive sheet for mounting the reflector.				e provided with a bracket				

Environmental Specification

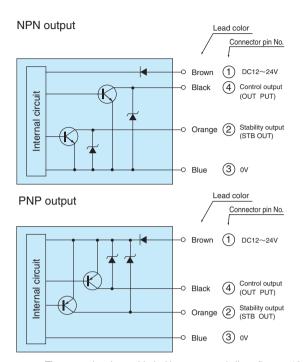
		•
	Ambient light	5,000 lx max.
	Ambient temperature	-25 - +55°C (non-freezing)
ent	Ambient humidity	35~85%RH (non-condensing)
E L	Protective structure	IP67
is	Vibration	10-55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction
Environment	Shock	500 m/s² / 3 times each in 3 directions
	Dielectric withstanding	1,000 VAC for 1 minute
	Insulation resistance	500 VDC, 20 MΩ or higher

*Detecting distances for different reflectors

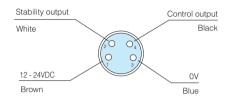
• The detecting distance depends on the reflector used.

Reflector model	K-71	K-7	S-25
Detecting distance	0.03 - 1.5m	0.03 - 2.5m	70 - 400mm

Input/Output Circuit and Connection



 M8 connector type (-J) pin assignment and connection (Receiver/reflective type sensor)



The colors show lead colors for use in combination with the optional cord with M8 connector.

(Transmitter)

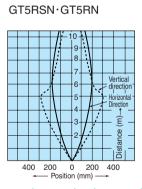
Lines other than Lines 1 (brown) and 3 (blue) are unused.



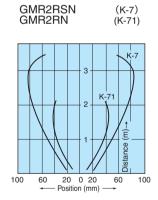
- The transmitter is provided with power supply lines (brown: 12-24 VDC; blue: 0 V) only.
- The output transistor turns off when load short circuit or overload occurs.
- Check the load and turn the power back on.

Characteristics (Typical Example)

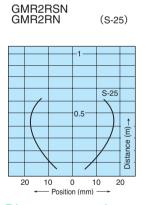
• Directional characteristics



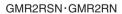
Operating angle characteristics

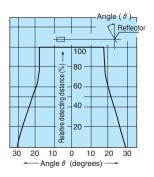


Activation area characteristics

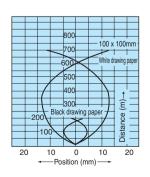


Distance-area characteristics

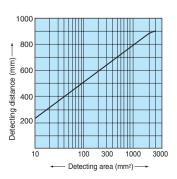




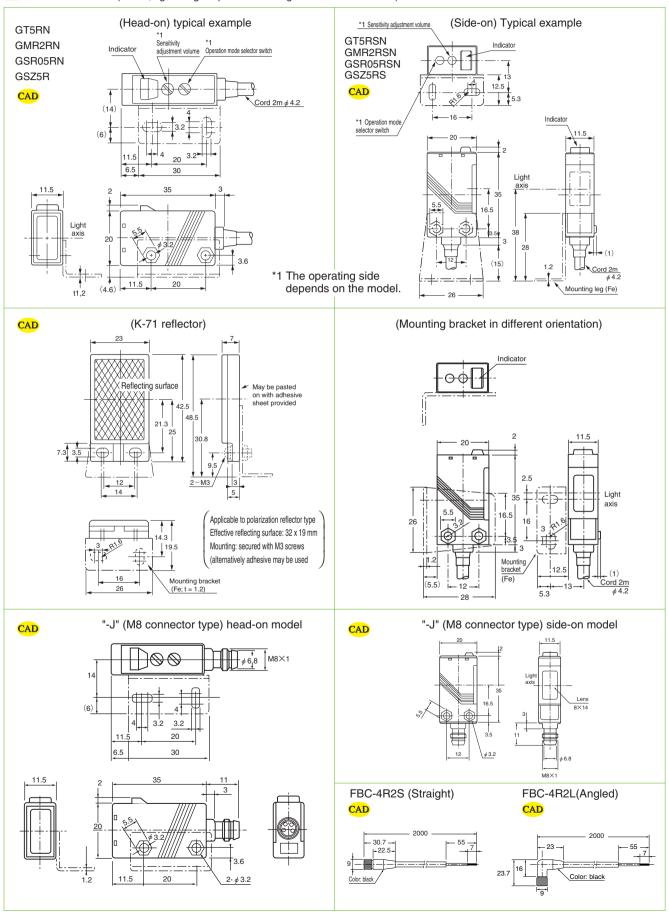
GSR05RSN·GSR05RN



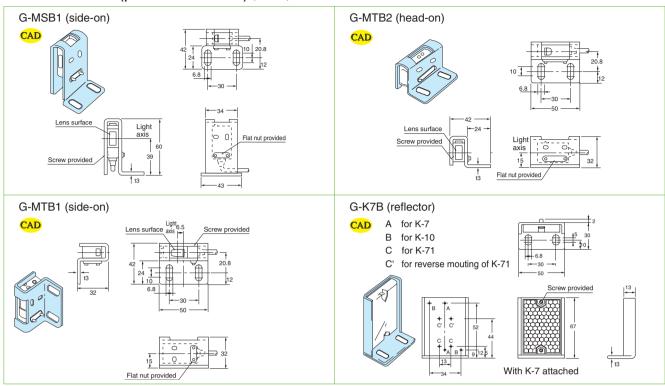
GSR05RSN·GSR05RN



Dimensions (in mm; tightening torque for mounting screws: 0.6 N·m max.)



■ Dimensions (protective cover) (in mm)



Operation Mode Switching

• Operation mode selector switch is provided for all models.



Dark-ON mode

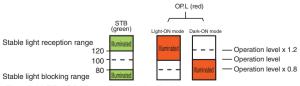




Light-ON mode: LIGHT (L) Dark-ON mode: DARK (D)

Indicators

- The operation indicator (red LED) and stability indicator (green LED) show the levels of light intensity as described in the figure below.
- After aligning the optical axis and adjusting the sensitivity, use a
 detection object to block and unblock the light beam several times
 to make sure that the sensitivity level is in a range that allows
 stable activation and deactivation.
- Setting the sensitivity in a range allowing stable operation achieves higher reliability against changes in the operating environment generated after the sensitivity is set.



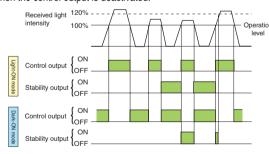
The red LED (OP.L) is the operation indicator.

In the L.ON (Light-ON) mode, the indicator is illuminated when a certain amount of light is detected.

In the D.ON (Dark-ON) mode, the indicator is illuminated when a certain amount of light is not detected.

Stability output

The stability output can be used to check for reduction of the light intensity level along with any change in the operating environment or operation over time or to perform initial check of the operation. When two consecutive detections have occurred with the intensity of light detected exceeding the operation level but not reaching 120 % of the level (range allowing stable operation), the stability signal is output when the control output is deactivated.



Sensitivity adjustment (for diffuse-reflective type) (Adjustment for Light-ON mode)

- When any light-reflecting object is in the background
- (1)Place the object to be detected in a given position, turn up the sensitivity adjustment volume (SENS.) gradually and find the point at which the operation indicator (red LED) is illuminated (Point A).
- (2)Remove the object, turn down the sensitivity adjustment volume gradually from MAX. and find the point at which the operation indicator (red LED) goes out (Point B). (If the operation indicator is not illuminated even at Max., MAX. is regarded as Point B.)
- (3)Set the volume at midway between Points A and B.







NT30F_{Series}



- Self-diagnostic feature
- High power for reliable detection in adverse environment
- Long distance detection of up to 30 m
 - DIN compatible zinc die-cast case
 - Receiver provided with "stability output circuit" for monitoring adequate light reception together with indicator and output terminal. Also equipped with monitor output jack for additional reliability in light axis alignment by use of earphone and Light-ON/Dark-ON selector switch.
 - Transmitter provided with "check signal input terminal" and "monitor output" for overall operation checking of transmitter and receiver.

Type

Detection method	Detecting distance	Model	Operation mode	Output mode
Through-beam type	30m	NT30F	Light-ON/Dark-ON selectable (with switch)	Current output/ voltage output

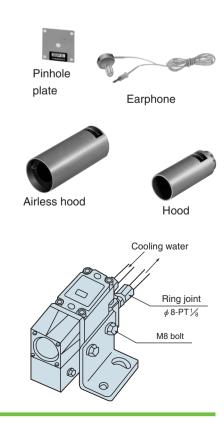
Extra long-distance of 50 m and 100 m also available
 Models allowing even longer detecting distance are also available.
 50 m type: model NT50 / 100 m type: model NT100

Optional Parts

Type	Model		Description	
	30P1	<i>φ</i> 1	Reduces the smallest	
	30P3	φ3	allowable detection object	
Pinhole plate	30P5	φ5	diameter and activation area.	
	30P7	φ7	Note that detecting distance	
	30P10	φ 10	is reduced as well.	
Earphone	EC30	Simplifies light axis alignment for long-distance setting by monitoring sound.		
	H301	Hood for shielding from outside light.		
Hood	F301	saving airless	ding from outside light. Energy- dust hood taking advantage of or preventing soiling of lens.	
	A301	Air purge hood.		

Model Equipped with Water-Cooing Jacket

Water-	NTL30FW	Transmitter	For protecting sensor from
	NTR30FW		ambient temperature



Rating/Performance/Specification

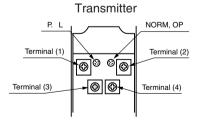
	Model	NT30F		
	Detection method	Through-l	peam type	
	Detecting distance	30m		
	Detection object	φ 22mm (M	lin.) Opaque	
	Power supply	12 - 24V DC ±10%	/ Ripple 10% max.	
g	Current consumption	Transmitter: 50 mA max	x. Receiver: 35 mA max.	
Rating/performance	Output mode	Current output/voltage output (Rating) Current output : sink current 100 mA (30 VDC) max. Voltage output: output impedance 4.7 k Ω		
g/perf	Operation mode	Light-ON/Dark-ON se	electable (with switch)	
Ratin	Self-diagnosis feature	(Transmitter) Check signal input (Terminal No. 4) Monitor output (Terminal No. 3): activated when normal (For current/voltage: sink current 100 mA (30 VDC) max. output impedance 4.7 kΩ) (Receiver) Stability output (Terminal No. 4): activated when abnormal (NPN open collector sink current 100 mA (30 VDC) max.) Received light monitor, earphone jack terminal		
	Response time	5ms max	. (*0.5ms)	
	Light source	Infrare	ed LED	
ion	Indicator	(Transmitter) P.L power indicator (red LED) NORM.OP: monitor output indicator (green LED)	(Receiver) OP.L operation indicator (red LED) UP: Stability indicator (green LED)	
cat	Switch (SW)	Light-ON/Dark-ON se	elector switch provided	
Specification	Short circuit protection	prov	rided	
Spe	Case material	Zinc d	ie-cast	
	Connection	Terminal block connection (scre	w: M3.5; terminal pitch: 8.1 mm)	
	Mass	About 700 g (tra	nsmitter/receiver)	

Environmental Specification

		<u> </u>						
invironment		Ambient light	20,000 lx max.					
	neu	Ambient temperature	-25 - +55°C (non-freezing) *1					
	ronr	Ambient humidity	35~85%RH (non-condensing)					
		Protective structure	IP66					
Ш		Vibration	10 - 55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction					

- *High-speed response type (0.5 ms) also available: model NT30FA
- *1 Some models may be used in environment of 110 °C by attaching water-cooling jacket.

Terminal Block and Connection

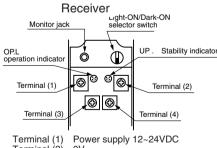


Terminal (1) Terminal (2) Terminal (3)

Power supply 12 - 24VDC

Terminal (4) Indicator Indicator

monitor output Voltage/current output Check signal input PL: power indicator (red LED) NORM.OP: monitor output (green LED)



Terminal (1) Terminal (2) Terminal (3) Output: voltage/current output

Terminal (4) Stability output (current output) Open collector Indicator Indicator

OP.L operation indicator (red LED) UP: Stability indicator (green LED) Selector switch: Light-ON/Dark-On selector switch Monitor jack:

for earphone for light axis alignment
Note) Be sure to use the earphone specified (EC30 separately available).

Operation and Stability Indicators

When the received light intensity is under the operation level, neither of the indicator is illuminated.

When the light intensity reaches the operation level, OP.L is illuminated (with selector switch set to LIGHT). When the light intensity reaches twice as much as the operation level, the stability indicator UP is illuminated.

Received optical output % 100 60 40 ◆Operation level 20 Not illuminated Receiver operation indication

NT30F

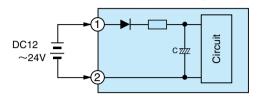
Input/Output Circuit and Connection

Transmitter (NTL30F)

Power supply connection

(For relay output (control))

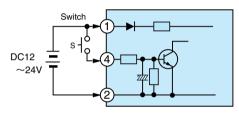
Indicator illuminated when power is supplied, indicating normal operation



Use of monitor output

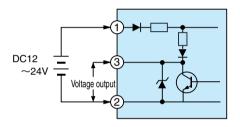
Relay activated when normal (relay of 30 VDC, 100 mA max.)

(For use of check signal input (HOLD))



Connect a switch, etc. between Terminals (1) and (4) (normally-open contact) and pres the switch. The light emission stops after about 25 ms and the output level turns H.

(For voltage output)



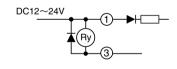
Light emission state = indicator (NORM.OP) illuminated output: ON (level)

Receiver (NTR30F)

Output connection

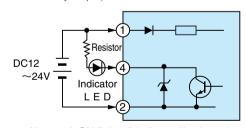
Terminal assignment for power supply same as transmitter:

(For relay output)



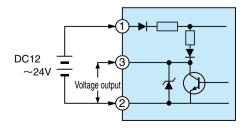
(relay of 30 VDC, 100 mA max.)

(For use of stability output)



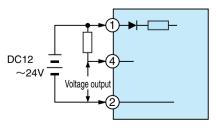
Abnormal: ON (L level) indicator illuminated Note) Connect a resistor in series with the indicator. (Hint) Resistance: 2 - 4 K Ω

(For voltage output)



Output mode selectable with switch between Light-ON/Dark ON

(For voltage output)

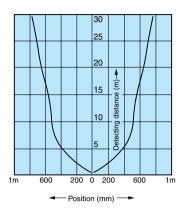


Connect a resister between Terminals (4) and (1) for voltage output between Terminal (4) and (2).

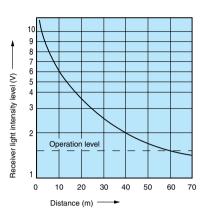
Output between Terminals (4) and (2): OFF (H level) when normal.

■ Characteristics (Typical Example)

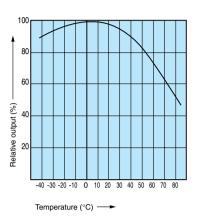
Directional characteristics



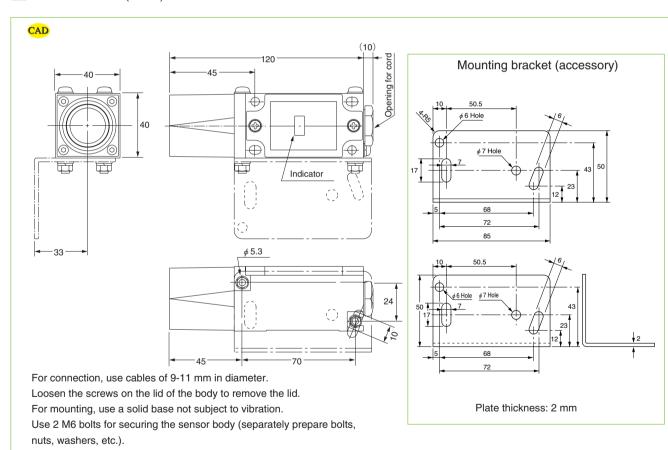
Distance-output characteristics

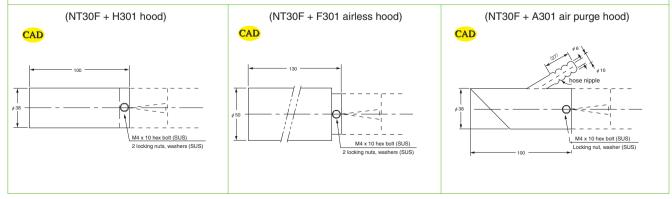


• Temperature characteristics



Dimensions (in mm)









- M18 cylindrical type compatible with European Standards (CENELEC)
- Polarization reflector type capable of detecting mirror-like objects
 - Thorough short circuit protection
 - Water resistance of IP 66 achieved by resin molding
 - Dramatic improvement of environment resistance including prevention of damage and falling off electronic components caused by vibration and enhanced robustness

Type

Detection method	Detecting distance	Mo	del	Operation mode	Output mode	Remarks
Detection method	Detecting distance	NPN type	PNP type	Operation mode	Output mode	nemarks
Through-beam type	3m	схтв *	CXT8PN *	Light-ON /Dark-ON selectable (with control lead)	Open collector	Infrared LED long-distance type
Polarization reflector type	2 m max.	CX-M2RD	CX-M2RDPN	Dark-ON		Red LED capable of detecting mirror-like objects
(1)	100 mm max.	CX-R01	CX-R01PN	Light-ON		Infrared LED
Diffuse- reflective type	300 mm max.	CX-R03V	CX-R03VPN	Ligiti-ON		Infrared LED type provided with adjustment for ease of fine detection

*Connector connection models convenient for mounting and wiring also available Models CXT8-J, CXT8PN-J

Cord with connector separately available required for connector connection models Model CX-C4 — 4-core, 2.5 m



■ Rating/Performance/Specification

	Martal	NPN type	СХТ8	CX-M2RD	CX-R01	CX-R03V	
	Model	PNP type	CXT8PN	CX-M2RDPN	CX-R01PN	CX-R03VPN	
	Detection method		Through-beam type	Polarization reflector type Diff		se-reflective type	
	Detecting distance		3m	2m*1	100mm *2	300mm *3	
	Detectio	n object	ϕ 15mm (Min.) Opaque	Mirror-like objects / opaque objects / translucent objects	Opaque objects / t	ranslucent objects	
<u>e</u>	Power	supply		12 - 24V DC ±10%			
Rating/performance	Current	NPN type	Transmitter: 25 mA max. Receiver: 15 mA max.	20mA max.	17mA max.	20mA max.	
3/perf	consumption	PNP type	Transmitter: 25 mA max. Receiver: 20 mA max.	24mA max.	23mA max.	26mA max.	
lating	Output	NPN type	Ol	oen collector Rating: sink cu	urrent 100 mA (30 VDC) ma	ax.	
ш	mode	PNP type	Оре	en collector Rating: source	current 100 mA (30 VDC) n	nax.	
	Operation	n mode	Light-ON/Dark-ON selectable	Dorle ON	Limb	+ ON	
	Operation	minode	(with control lead)	Dark-ON	Light-ON		
	Respon	se time	1ms max.		0.35ms max.	0.35ms max.	
	Operating angle		7° (at receiver)	10° (at receiver)			
	Hysteresis				5% ı	max.	
	Light source (wavelength)		Infrared LED (940nm)	Red LED (700nm)	Infrared LED (950nm)		
	Indicator		Transmitter: Power indicator (red LED)	Operation indicator (red LED)))	
			Receiver: Light reception indicator (red LED)		')		
	Volu	ıme				Sensitivity adjustment	
	Short circuit	t protection		Provided			
ioi	Mate	erial	Lens: Polycarbonate	Lens: Acrylic	Lens: Poly	ycarbonate	
ficat			Case: Polycarbonate	Case: Polycarbonate	Case: Pol	ycarbonate	
Specification	Connection Transmitter: 0.2 sq. 2 core 2 m		Permanently attached cord (outer diameter: 4 mm) Transmitter: 0.2 sq. 2 core 2 m length (gray) Receiver: 0.2 sq. 4 core 2 m length (black)	Permanently attached cord (outer dimension: dia. 4) 0.2sq. 3 core 2 m length (black)		·	
	Mass Transmitter: About 0		Transmitter: About 65 g Receiver: About 65 g	About 65 g			
	Notes		Slit plate (optional) 3 x 10, 4 x 10, 5 x 10 in 1 set	K-7 reflector provided			

Environmental Specification

	Ambient light	10,000 lx max. (5,000 lx max. for through-beam type)	
	Ambient temperature	-25 - +55°C (non-freezing)	
ent	Ambient humidity	35 - 85%RH (non-condensing)	
nn	Protective structure	IP66	
iro	Vibration	10 - 55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction	
Environment	Shock	100 m/s ² / 3 times each in 3 directions	
	Dielectric withstanding	500 VAC for 1 minute	
	Insulation resistance	500 VDC, 20 MΩ or higher	

Applicable power supply unit PS Series

High capacity of 200 mA at 12 VDC



(General-purpose type)

PS3N PS3N-SR

(Multifunctional type)

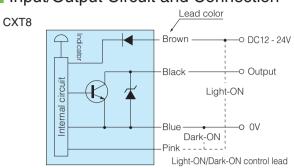
PS3F PS3F-SR

^{*3} With 100 x 100 mm white drawing paper

CX

CX-M2RD

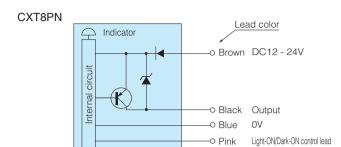
Input/Output Circuit and Connection



NPN output

→ Blue

OV



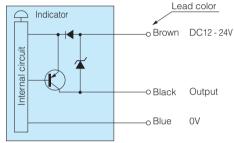
CX-R03V

Lead color
Brown DC12 - 24V

Black Output

CX-M2RDPN PNP output
CX-R01PN
CX-R03PN

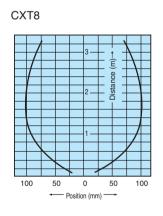
Activation area characteristics

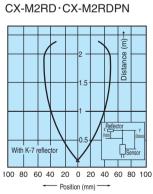


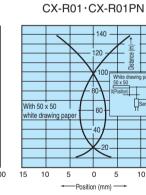
[•] The output transistor turns off when load short circuit or overload occurs. Check the load and turn the power back on.

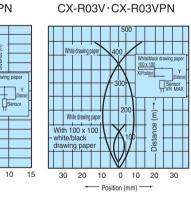
■ Characteristics (Typical Example)

• Directional characteristics



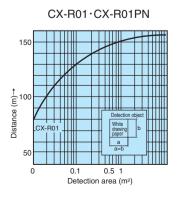


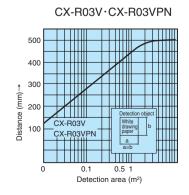




Operating angle characteristics

• Distance-output characteristics

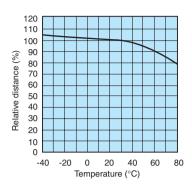




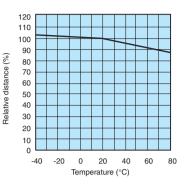


Temperature characteristics

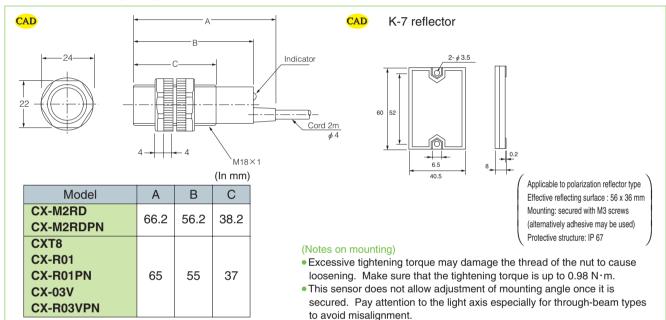
CX-M2RD CX-M2RDPN



CX-R01 CX-R01PN CX-R03V CX-R03VPN



Dimensions (in mm)



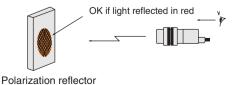
Setting

(Through-beam type)

- For light axis alignment, swivel the receiver vertically and horizontally to install it at the center of the area in which the light reception indicator (red LED) is illuminated for the individual direction.
- Repeat activation and deactivation to check the operation.

(Polarization reflector type)

 Arrange the sensor in line with the reflector. Swivel the sensor vertically and horizontally with reference to the reflector, use the operation indicator to check the area in which the sensor is activated (indicator goes out) and install the sensor at the center of the area. Taking advantage of the red light spot on the reflector seen from behind the sensor allows easy setting.



(Diffuse-reflective type)

- Set the sensor so that the operation indicator (red LED) is illuminated with the detection object placed at a given position and not illuminated with the object removed.
- Bring any background of the detection object as far away as possible or use black surface with low reflectance.
- The detecting distance depends on the surface condition of the detection object. This sensor is not provided with a sensitivity adjustment volume and needs to be adjusted for stable operation by changing the distance, angle, background object, etc.

(Diffuse-reflective type with adjustment)

- Adjustment with any light-reflecting object in the background
- (1) Place the object to be detected in a given position, turn up the sensitivity adjustment volume (SENS) gradually from the minimum (MIN) and find the point at which the operation indicator (red LED) is illuminated (Point A).
- (2) Remove the object, turn down the sensitivity adjustment volume gradually from the maximum (MAX) and find the point at which the operation indicator (red LED) goes out (Point B). (If the operation indicator is not illuminated even at MAX, MAX is regarded as Point B.)
- (3) Set the volume at midway between Points A and B.







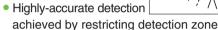
DLZSeries

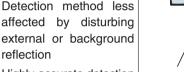


Stable detection performance by limiting detection zone for less influence of disturbance

Reflective type photo sensor with light axes of transmitter and receiver crossed at about 20 mm from sensor for limiting detection zone

 Detection method less affected by disturbing external or background reflection

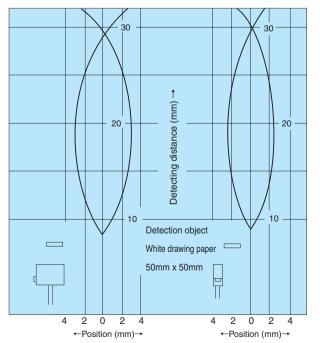




Type

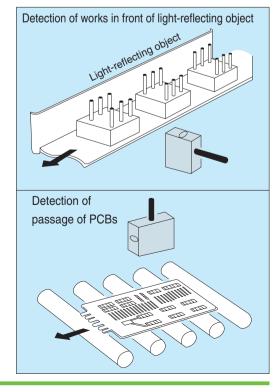
Detection method	Detecting distance	Model	Operation mode	Output mode
		DLZ-S30	Light-ON	NPN open
∇		DLZ-S30D	Dark-ON	collector PNP open
Limited reflection type	7pe 10~30mm	DLZ-S30-PN	Light-ON	
		DLZ-S30D-PN	Dark-ON	collector

Activation area characteristics(Typical Example)



This product is a reflective type sensor and the detecting distance varies depending on the detection object. To install the sensor first check the distance using the object to confirm.

Sample Applications

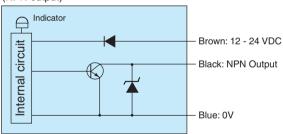


■ Rating/Performance/Specification

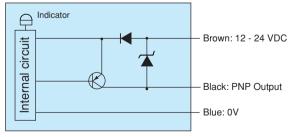
		Mode	el	DLZ-S30	DLZ-S30D	DLZ-S30-PN	DLZ-S30D-PN	
	Detection method		method	Limited reflection type (specular reflection)				
بو	Detecting distance		listance		About 30mm (50 x 50 m	m white drawing paper)		
anc	Dete	ction	object		<i>φ</i> 10	max.		
L L	Pov	ver su	upply		12 - 24V DC ±10%	/ Ripple 10% max.		
erfo	Curren	t cons	sumption		30mA	max.		
d/bi	Ou	tput n	node	NPN ope	n collector	PNP oper	n collector	
Rating/performance			Rating	Sink current 100 r	mA (30 VDC) max.	Source current 100	mA (30 VDC) max.	
<u> </u>	Ope	ration	mode	Light-ON	Dark-ON	Light-ON	Dark-ON	
	Res	ponse	e time	0.5ms max.				
	H	ystere	esis	2% max.				
	Lig	ht so	urce	Infrared LED (wavelength: 880 nm)				
	li li	Indicator		Operation indicator (red LED)				
	Short circuit protection		protection	Provided				
	Material	(Case		Polyarylate			
io.	Material	Lens		Polycarbonate				
icat	Co	onnec	tion		Permanently attached cord (outer dimension: dia. 4)			
Specification		JIII160	,tiori	0.2 sq. 3 core 2 m length				
Sp		Mass	S	About 70 g				
	Am	bient	light	5,000 lx max.				
	Ambier	nt tem	perature		-25 - +55°C (non-freezing)		
	Ambi	ent hu	umidity		35 - 85%RH (no	on-condensing)		
	Protec	tive s	tructure		IP6	65		

Input/Output Circuit and Connection

(NPN output)



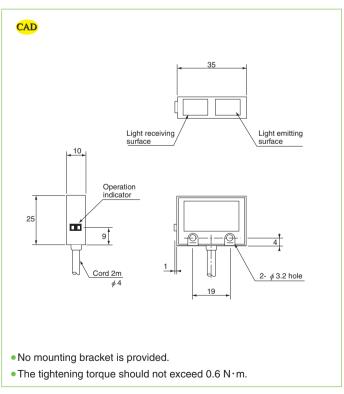
(PNP output)



 The output transistor turns off when load short circuit or overload occurs.

Check the load and turn the power back on.

Dimensions (in mm)



GMseries



- Equipped with inverter light suppression circuit
- Perforated objects reliably detected with large-diameter light spot (GM-S Series)

Applications

- Lead frame detection
- PDB detection
- Board detection

Type

Detection method	Detecting distance	Mo	del	Operation mode	Output mode	
Detection method	Detecting distance	NPN type	PNP type	Operation mode	Output mode	
Wide-angle diffuse-reflective type	50mm	GM-S5RT(-J)	GM-S5RTPN(-J)	Light-ON	Open collector	
Limited zone-reflective type		GM-Z5RT(-J)	GM-Z5RTPN(-J)		Open collector	

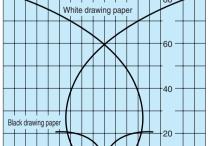
GM-Z5RT

Optional Parts

Type	Model	Shape
Cord with M8	FBC-4R2S	Straight (2 m)
connector	FBC-4R2L	Angled (2 m)

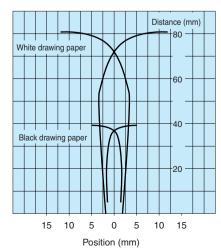
Directional characteristics (Typical Example)

• GM-S5RT



Position (mm)





M8 connector type (-J)



10

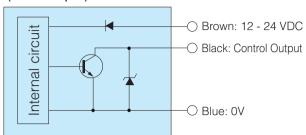
GM

■ Rating/Performance/Specification

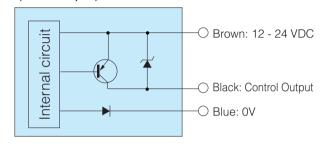
-	_			011 0-DT		
		Model	NPN type	GM-S5RT	GM-Z5RT	
		WOOCI	PNP type	GM-S5RTPN	GM-Z5RTPN	
		Detection method		Wide-angle diffuse-reflective type	Limited zone-reflective type	
	Rating/performance	Detecting distance		50mm Standard detecting object: (100 x 100 mm white drawing paper)	50mm Standard detecting object: 50 x 50 mm white drawing paper)	
	ma	Powe	r supply	12-24V DC ±10%	/ Ripple 10% max.	
	إوّ	Current of	consumption	32mA max.	30mA max.	
	bel	Emittad ligh	nt spot diameter	About 20 mm	About 4 mm	
	ng/	Lillilled ligi	it spot diameter	(at 20 mm)	(at 20 mm)	
	ati	Control output		Open collector output		
	_		Rating	NPN type: Sink current 100 mA (30 VDC) max. / Residual voltage: 1 V or less		
			Training	PNP type: Sink current 100 mA (30 VDC) max. / Residual voltage: 1 V or less		
		Operation mode		Light-ON		
		Response time		1ms max		
	ĕ	Light source		Red LED (644nm)		
	and	Indicator		Operation indicator (orange LED) Stability indicator (green LED)		
	ũ	Volume		SENS: sensitivity adjustment volume		
) L	Short circuit protection		Provided		
7 7	a	Con	nection	Permanently attached cord (outer dimension: dia. 3.9mm) 0.2 sq. 3 core 2 m length		
	Rating / Performance	COIII	IECHOII	Connector type with M8 connector (-J at the end of model No.)		
	atir	M	lass	About 50g (permanently attached cord) About10g (M8 connector type)		
	<u>س</u> ا	Accessory		Screwdriver for adjustment, operation manual		

Input/Output Circuit and Connection

(NPN output)



(PNP output)



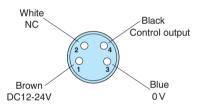
 The output transistor turns off when load short circuits or an overload occurs.

Check the load and turn the power back on.

Environmental Specification

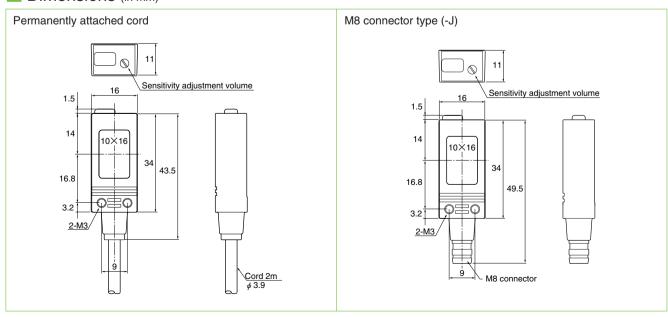
	Ambient light	5,000 lx max.	
	Ambient temperature	-25 - +55 °C (non-freezing)	
ent	Ambient humidity	35-85%RH (non-condensing)	
nm	Protective structure	IP67	
iro	Vibration	10~55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction	
Environm	Shock	500 m/s ² / 3 times each in 3 directions	
	Dielectric withstanding 1,000 VAC for 1 minute		
	Insulation resistance	500 VDC, 20 M Ω or higher	

M8 connector type (-J) connection



- The colors show lead colors for use in combination with the optional cord with M8 connector.
- White line (NC) is unused.

Dimensions (in mm)







Ultra thin beam and high power are achieved at the same time

LD-M10R (polarization reflector type)

- Ultra thin laser beam is ideal for detecting minute objects
- Long distance detection up to 15 m is possible (with K-7 reflector)
- Various reflectors available for different detecting distances

LD-S20R (diffuse-reflective)

- Variable-focus spot adjustable down to ϕ 1 (In the range of 80-300 mm from light receiving surface)
- Red laser for simple position checking of emitted light spot
 - Extra thin laser beam ideal for detection of passage/presence or protrusion of minute objects through gap or small hole



Laser beam employed

Do not look into the beam, do not direct light to human body and follow all instructions for correct and safe use.

Type

Detection method	Detecting distance	Model	Operation mode	Output mode
① Polarization	The detecting distance depends	LD-M10R	Light-ON/ Dark-ON selectable (with switch)	NPN open collector
reflector type		LD-M10RPN		PNP open collector
€€ Diffuse-	80~300mm	LD-S20R		NPN open collector
reflective type		LD-S20RPN		PNP open collector

Optional Parts

Product name	Model	Detecting distance(m)	Effective reflecting surface (mm)	Purpose/application
	K-15	0.3~7	36×55	For minute object detection
	S-0503A	0.5~7	24×24	For minute object detection
	K-72	1~5	29×8	For minute object detection
Reflector	K-MT4	1~7	35×35	For minute object detection
	K-71	3~5	32×19	When there is restriction to mounting of reflector
	K-7	3~15	56×36	For long distance detection

[■]Select according to the detecting distance of the application and purpose (separately available). Note that reflectors other than mentioned above may not be compatible with the sensor.



Rating/Performance/Specification

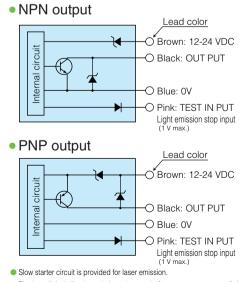
	Туре	NPN output type	PNP output type	NPN output type	PNP output type		
	Model	LD-M10R	LD-M10RPN	LD-S20R LD-S20RPN			
	Detection method	Polarization	reflector type	Variable-focus reflective type			
	Spot variable range			80mm - 300mm *3			
	Detecting distance	Depending on reflector (separately available)		30-300mm (10 x 10 mm white drawing paper) *3			
ance	Power supply	Power supply 12-24V D0		±10% / Ripple 10% max.			
orm	Current consumption	35mA max. *1	40mA max. *1	35mA max. *1	40mA max. *1		
Rating/performance	Output mode	NPN open collector output Sink current 100 mA (30 VDC) max.	PNP open collector output Source current 100 mA (30 VDC) max.	NPN open collector output Sink current 100 mA (30 VDC) max.	PNP open collector output Source current 100 mA (30 VDC) max.		
Ratii	Operation mode		Light-ON/Dark	-ON selectable			
_	Anti Interference		Provided				
	Light Emission Stop Function	No-voltage input (contact/non-contact)					
	Response time		0.5ms	s max.			
	Spot diameter	15 x 7 mm ell	ipse (at 15 m)	ϕ 1mm(adjustable range: 80-300 mm from light receiving surface)			
	Smallest detectable mark width			1 mm (black mark on whit	e background) at 300 mm		
	Light source (wavelength)	Red semiconductor laser (650 nm) Class 2					
	Indicator	Operation indicator (red LED) Stability indicator (green LED)					
_	Volume	SENS: sensitivity adjustment					
atio	Switch	Light-ON/Dark-ON selector switch provided					
cific	Short circuit protection	Provided					
Specification	Connection	Permanently attached cord (outer dimension: dia. 4) 0.2 sq. 4 core 2 m length (black)					
	Material	Case: heat-resistant	t ABS Lens: Acrylic	Case: heat-resistant ABS Transmitter lens: glass /	Transmitter hood: aluminum / Receiver lens: acrylic		
	Mass	Approx. 80g					
	Accessory	Operation manual, mounti	ing bracket, screwdriver for s	Operation manual, mounting bracket, screwdriver for sensitivity adjustment, warning label, instruction label *2			

^{*1} Allow sufficient margin in the capacity of the power supply (the laser diode is equipped with a circuit that maintains the same light intensity level by increasing the current if it becomes dark).

Environmental Specification

	Ambient light	5,000 lx max.	
	Ambient temperature	-10 - +55°C (non-freezing)	
	Ambient humidity	35 - 85%RH (non-condensing)	
j j	Protective structure	LD-M Series: IP67	
Environment	Frotective structure	LD-S Series: IP66	
viro	Vibration	10 - 55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction	
ᇤ	Shock	LD-M series: 500 m/s 2 / 3 times each in 3 directions	
	SHOCK	LD-S series: 300 m/s² / 3 times each in 3 directions	
	Dielectric withstanding	1,000 VAC for 1 minute	
	Insulation resistance	500 VDC, 20 M Ω or higher	

Input/Output Circuit and Connection



The laser light is illuminated about 1 second after power-up or reset of short circuit caused by emission stop input.

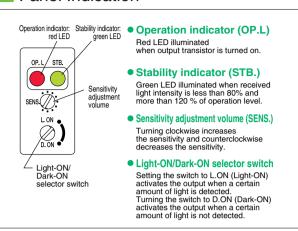
The output transistor turns off when load short circuit or overload occurs.
 Check the load and turn the power back on.

^{*2} The LD-M10 R Series is not provided with a reflector, which is optional.

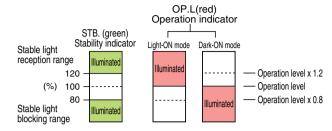
^{*3} Distance from the sensor receiving lens surface.

LD-M LD-S

Panel Indication



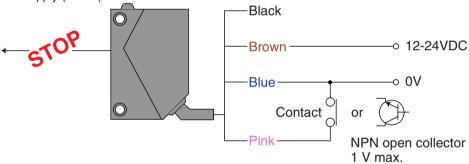
About indicators



- The operation indicator (red LED) and stability indicator (green LED) indicate the levels as shown above. After light axis alignment and sensitivity adjustment have been completed, repeat activation and deactivation to make sure that the sensitivity is in the stable activation/deactivation range.
- Setting within the stable range increases the reliability against variation of environment after setting.

Using Light Emission Stop Function

Short-circuiting TEST IN PUT (pink) and 0 V (blue) stops the laser light emission at arbitrary timing.
 When not using the light emission stop function, connect TEST INPUT (pink) to the positive terminal of the power supply (brown).



For Correct Use



- •Do not use the product for detection for the protection of human body.
- ·When using the product for safety purposes, ensure safety with the control system as a whole as well as the detection.
- •This product is not explosion proof.
- The semiconductor laser used in this product falls under the following class as defined in JIS C 6802 "Safety of Laser Products."
 - Class 2 (Emits visible radiation from which the eyes are generally protected by the aversion reactions)
- This product employs a parallel beam of laser and care should be taken not to allow the laser light to enter human eye directly or by specular reflection. Never look into the laser radiation outlet of the transmitter connected to power supply.
- Looking straight into the laser light may damage the eye.
- This product is provided with warning and instruction labels as shown below for notifying and alerting the operator of the sensor of the degree of danger. After the product has been installed, attach the labels in prominent locations on the sensor.

Warning label



Instruction level
•Class 2



 The radiated laser beam is elliptic due to the characteristics of semiconductor laser. In addition, diffraction pattern is generated due to optical diffraction phenomenon.



- Be notified that this product uses semiconductor laser and is prone to deterioration due to surge current or static electricity.
- The laser diode is equipped with a circuit that maintains the same light intensity level by increasing the current if it becomes dark. For this reason, allow sufficient margin in the capacity of the power supply.
- Always avoid use in which the power is turned on and off consecutively.
- Be sure to turn off the power before moving including mounting and removing or repairing.
- Follow the notes on safety and handling in the operation manual provided for correct use.

LD-M LD-S

Sample Applications

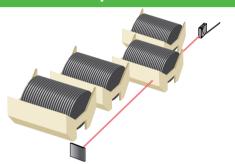
LD-M10R Series

Detection of position of vehicle in multilevel parking garage

Checks for any protrusion of vehicle in multilevel parking garage.



Detection of displaced cassettes

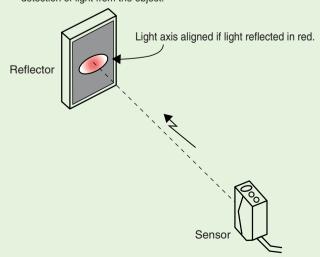


Setting/adjustment

- Arrange the sensor face-to-face and in line with the reflector. Swivel the sensor vertically and horizontally with reference to the reflector, use the operation indicator (red LED) to check the area in which the sensor is activated and install the sensor at the center of the area. Make sure that the stability indicator (green LED) is illuminated.
- 2) Use the sensitivity adjustment volume for fine-tuning when detecting thin rod-like or small objects.

(Note)

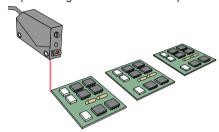
Light reflected on the object may be detected depending on the object such as glossy detection objects including stainless steel. In this case, use the sensitivity adjustment volume to prevent detection of light from the object.



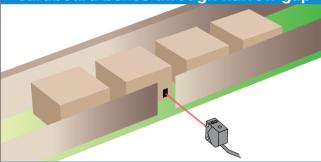
LD-S20R Series

Positioning of hybrid boards

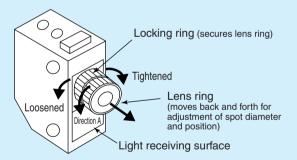
High-precision positioning achieved with micro-spot laser beam.



Detection of marks on corrugated cardboard boxes through narrow gap



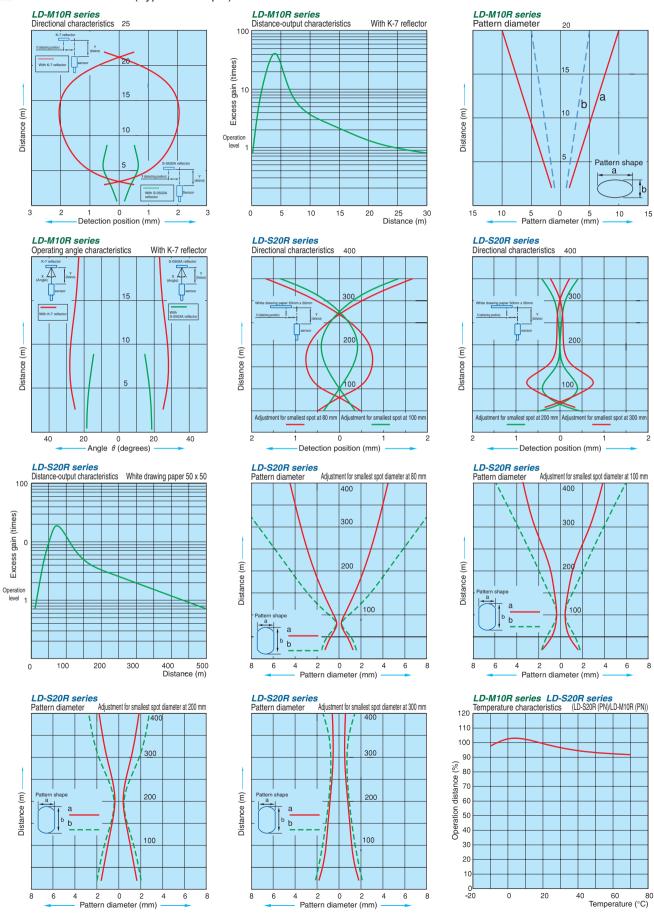
Spot position adjustment for variable-focus type sensor



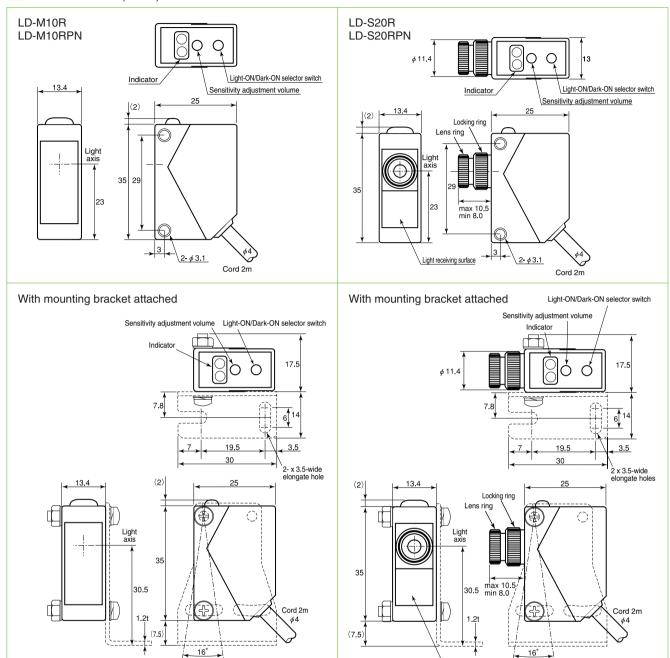
- The spot position is variable between 80 and 300 mm from the light receiving surface.
- The factory setting makes the spot diameter smallest at 300 mm from the light receiving surface. For adjusting the spot position, make sure that there is no obstacle especially in front of the receiver lens and follow the procedure below:
- 1) For viewing the spot, place a white piece of paper in front of the detection object. (Never look into the laser radiation outlet.)
- 2) (With the locking ring tightened,) turn the lens ring for adjusting the spot diameter and position while monitoring the spot on the white paper. In the figure above, turning in the direction A brings the spot position closer to the sensor.
 - The lens ring is designed to require a certain amount of force to turn for preventing loosening, which may be felt when turning the lens.
- When adjusting for a short distance, loosen the locking ring a little, make adjustment as described above and securely tighten the locking ring.
- 4) After the adjustment, mount and secure the sensor body again.

LD-M LD-S

Characteristics (Typical Example)



Dimensions (in mm)



Optional Parts (in mm)

Reflector model	K-7	K-15	K-MT4	K-71	K-72	S-0503A
Detecting distance	3∼15m	0.3~7m	1~7m	3∼5m	1~5m	0.5~7m
Effective reflecting surface	56×36mm	36×55mm	35×35mm	32×19mm	29×8mm	24×24mm
Dimensions (in mm)	40.5	52 60 	52 7	42.5	33.8	40 (6,6)

Light receiving surface





Thin red laser beam allows highlyaccurate detection

- Minute object detected at long distance
- Wide variety of models for different detecting distances and detection objects
- Simple adjustment with red spot
- Class 1 and 2 models available

Reflective type (LD-S33R)

- 0.5 mm mark detected at long distance of 300 mm
- Small-field beam allowing detection through gaps and small holes
- Light emission stop function provided

Take safety measures according to the operation manual.

Type

Detection method	Detecting distance	Model	Detection object	Operation mode	Output mode
	20m	LD-T20R	Opaque objects of ϕ 20 mm or larger		
	15m	LD-T20R-P2	Opaque objects of ϕ 2 mm or larger		
	7m	LD-T20R-P1	Opaque objects of ϕ 1 mm or larger		
(1)	3m	LD-T20R-P05	Opaque objects of ϕ 0.5 mm or larger	Light-ON/	Open
Through-	0.7m	LD-T20R-P03	Opaque objects of _0.3 mm or larger	Dark-ON	collector
beam type	20m	LD-T20R-C1	Opaque objects of _20 mm or larger	selectable	
	10m	LD-T20R-C1-P2	Opaque objects of _2 mm or larger	(with switch)	
	5m	LD-T20R-C1-P1	Opaque objects of _1 mm or larger		
Limited reflection type	200~400mm	LD-S33R	O.5mm min. (black mark on white background) Detecting distance 300mm		NPN open collector output

PNP output type

PNP output types are available for all models.

PNP output type models are identified by "PN" at the end of model number.

The rating/performance other than the output is the same as those of NPN types.

Optional parts

Туре	Model	Applicable model	Shape, etc.	
Cord with M8	FBC-4R2S	For M8 connector type	Straight with 4-core cord of 2 m (transmitter/receiver)	
connector	FBC-4R2L	Por ivio connector type	Angled with 4-core cord of 2 m (transmitter/receiver)	
Protective cover	G-MTB2	For through-beam LD-T20R	Rigid protective cover doubling as mounting bracket. See "Dimensions (optional parts)."	



■ Rating/Performance/Specification

	Model	NPN type	LD-T20R	LD-T20R-C1	LD-S33R	
	wodei	PNP type	LD-T20RPN	LD-T20RPN-C1		
	Detection method		Through-b	Limited reflection type		
	Power	supply	12 - 24V DC ±10% / Ripple 10% max		ζ.	
8	Current	NPN type	Transmitter: 20 mA max. Receiver: 20 mA max.		38mA以下	
nan	consumption	PNP type	Transmitter: 20 mA max.	Receiver: 25 mA max.		
Rating/performance	0.1.1	Control	NPN open collector output Rating:	sink current 100 mA (30 VDC) max.	NPN open collector 2 outputs Rating: sink current 100 mA (30 VDC) max.	
ating	Output mode	Output	PNP open collector output Rating: se	ource current 100 mA (30 VDC) max.		
8		Stability	NPN open collector output Rating:	sink current 50 mA (30 VDC) max.		
		output	PNP open collector output Rating: s	source current 50 mA (30 VDC) max.		
	Operation	on mode		Light-ON/Dark-ON selectable		
	Respon	ise time	0.5ms max.			
	Operatir	ng angle	30° (at receiver)			
	Spot di	ameter			About 2 mm at 300 mm	
	Smallest detectable mark width				0.5 mm (black mark on white background) at 300 mm	
	Light source (light wavelength)		Red semiconductor laser (650 nm) Class 2	Red semiconductor laser (650 nm) Class 1	Red semiconductor laser (650 nm) Class 2	
	Indic	pator	Transmitter: power indicator (green LED)		Operation indicator (red LED)	
	maic	Jaioi	Receiver: operation indicator (red LED) Stability indicator (green LED)		Stability indicator (green LED)	
ا _	Volume		SENS: sensitivity adjustment (at receiver)		8-turn sensitivity adjustment	
atio	Sw	itch	Light-ON/Dark-ON selector switch provi		ded	
oilic	Short circui	t protection	Provided (for control output only)		Provided	
Specification	Material	Case	Polya	rylate	Body: zinc die-cast / Aluminum head: heat- resistant ABS / Display: polycarbonate	
		Lens	Acr	ylic	Glass	
	Conn	ection	Permanently attached cord Transmitter: 0.3 sq. 2 core 2 m length (gray)	,	Permanently attached cord (outer dimension: dia. 4.5) 0.2 sq. 5 core 2 m length	
			-J type: M8 conn	ector connection		
	Ма	ass	Permanently attached cord type: about 80 g (transmitt	er/receiver) / -J type: about 25 g (transmitter/receiver)	Approx. 300g	
	Notes		Mounting brack	et, operation manual, warning label,	instruction label	

Environmental Specification

		LD-T20R	LD-S33R	
	Ambient light	5,000 lx max.	Sunlight: Light receiving surface illumination 10,000 max. Incandescent lamp: receiving surface illumination 3,000 lx max.	
ä	Ambient temperature	-10 - +55°C		
nme	Ambient humidity	35 - 85%RH		
Environment	Protective structure	IP67	IP66	
ᇤ	Vibration	10 - 55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction		
	Shock	500 m/s² / 3 times each in 3 directions	100 m/s² / 3 times each in 3 directions	
	Dielectric withstanding	1,000 VAC for 1 minute		
	Insulation resistance	500 VDC, 20 MΩ or higher		

Applicable power supply unit PS Series High capacity of 200 mA at 12 VDC



(General-purpose type)

PS3N

PS3N-SR

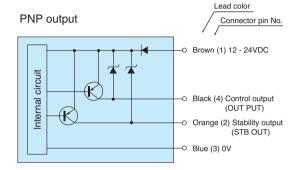
(Multifunctional type)

PS3F PS3F-SR

LD

Input/Output Circuit and Connection

NPN output Connector pin No Brown (1) 12 - 24VDC Black (4) Control output (OUT PUT) Orange (2) Stability output (STB OUT) Blue (3) 0V



- The output transistor turns off when load short circuit or overload occurs. Check the load and turn the power back on.
- The stability output is not provided with short circuit protection.

Switching between Light-ON and Dark-ON

The operation mode selector switch is provided on the receiver.

Turn to L for Light-ON mode and D for Dark-ON mode.

Light-ON mode

Dark-ON mode

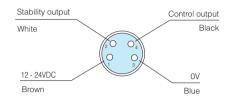




■ M8 connector type (-J)

Pin assignment

(Receiver)



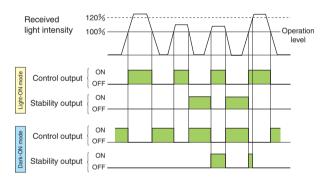
The colors show lead colors for use in combination with the optional cord with M8 connector.

(Transmitter)

Lines other than Lines 1 (brown) and 3 (blue) are unused.

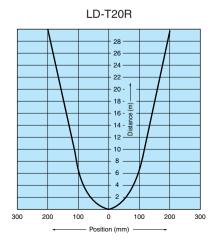
Stability output

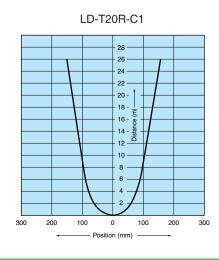
The stability output can be used to check for reduction of the light intensity level along with any change in the operating environment or operation over time or to perform initial check of the operation. When two consecutive detections have occurred with the intensity of light detected exceeding the operation level but not reaching 120 % of the level (range allowing stable operation), the stability signal is output when the control output is deactivated.



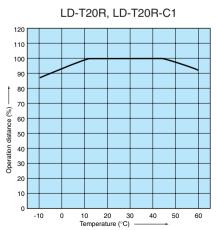
Characteristics (Typical Example)

Directional characteristics





Temperature characteristics





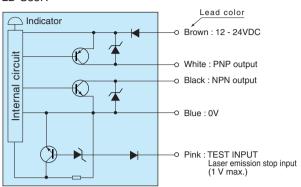
Panel Indication

LD-S33R



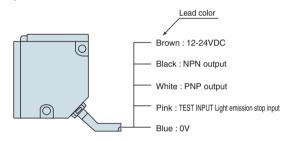
■ Input/Output Circuit and Connection

LD-S33R

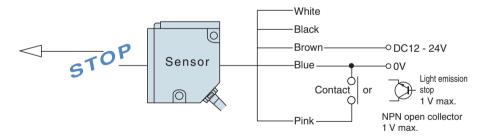


Slow starter circuit is provided for laser emission. The laser light is illuminated about 0.5 seconds after power-up or reset of short circuit caused by emission stop input.

The output transistor turns off when load short circuit or overload occurs. Check the load and turn the power back on.



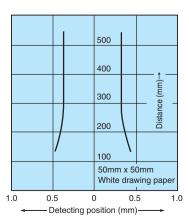
■ Using Light Emission Stop Function (LD-S33R only)



Short-circuiting the blue and pink leads of the transmitter stops the laser light emission at arbitrary timing.

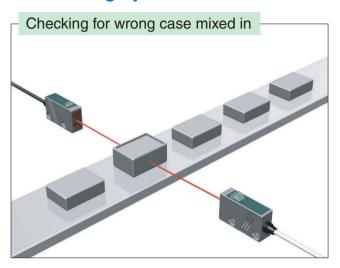
Activation Area Characteristics (Typical Example)

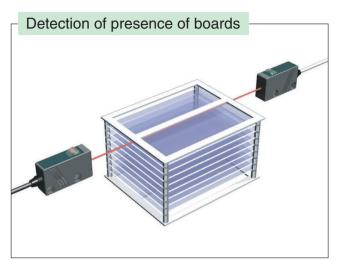
LD-S33R

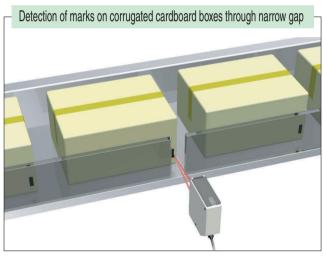


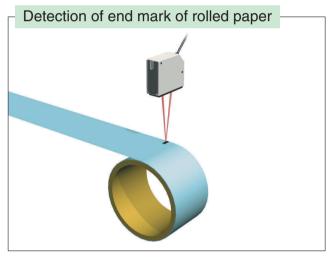
Sample Applications

Highly-accurate detection achieved with extra thin beam









For Correct Use



- ·Do not use the product for for the protection of human body.
- ·When using the product for safety purposes, ensure "System-Wide" safety with the control system as a whole as well as the detection.
- •This product is not explosion proof.
- The semiconductor laser used in this product falls under the following class as defined in JIS C 6802 "Safety of Laser Products."
 - ·Class 1 (Intrinsically safe under the rationally predictable operation conditions)
 - ·Class 2 (Emits visible radiation from which the eyes are generally protected by the aversion reactions)
- This product employs a parallel beam of laser and care should be taken not to allow the laser light to enter human eye. Never look into the laser radiation outlet of the transmitter connected to power supply. Looking straight into the laser light may damage the eye.
- This product is provided with warning and instruction labels as shown below for notifying and alerting the operator of the sensor of the degree of danger. After the product has been installed, attach the labels in prominent locations on the sensor.

Warning label

Instruction level



•Class 1

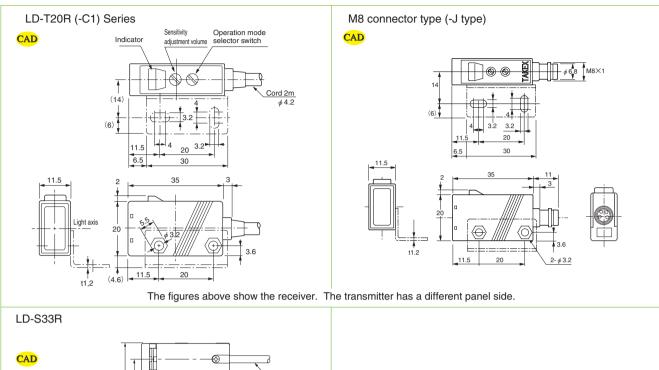


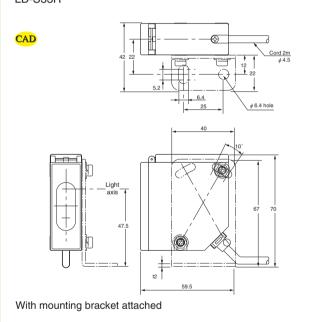
• The radiated laser beam is elliptic due to the characteristics of semiconductor laser. In addition, diffraction pattern is generated due to optical diffraction phenomenon.



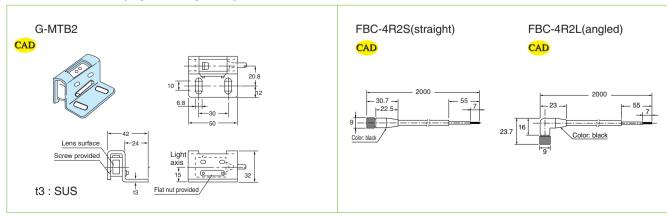
- Be notified that this product uses semiconductor laser and is prone to deterioration due to surge current or static electricity.
- The laser diode is equipped with a circuit that maintains the same light intensity level by increasing the current if it becomes dark. For this reason, allow sufficient margin in the capacity of the power
- Always avoid use in which the power is turned on and off consecutively.
- Be sure to turn off the power before moving including mounting and removing or repairing.

Dimensions (in mm)

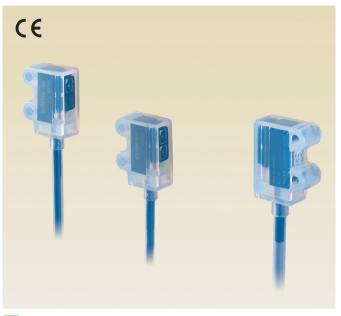




■ Dimensions (Optional parts) (in mm)



PFseries



 Embedded amplifier sensor with body and cord covered with fluoroplastic (PFA) housing and tube for enhanced resistance to oils and chemicals.

Excellent resistance to oils and chemicals, capable of immersed use.

- Easy-to-use embedded amplifier sensor
- Long detecting distance (through-beam: 3 m; diffuse-reflective: 30 cm)
- High-speed response of 0.35 ms
- Optional external sensitivity adjustment employed

Type

Detection method	Detecting distance	Model	Operation mode	Output mode
Through-beam type	3m	PF-T3DS	Dark-ON	NPN open
Diffuse-reflective type	300mm	PF-R03S	Light-ON	collector output

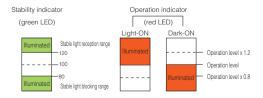
Red LED models

Red LED is used for light emitting element for resistance to underwater attenuation for detection of objects in water.

Model PF-T3RDS (through-beam) Model PF-R03RS (reflective)

Indicators

- The operation indicator (red LED) and stability indicator (green LED) show the levels of light intensity as described in the figure below.
- After aligning the optical axis and adjusting the sensitivity, use a detection object to block and unblock the light beam several times to make sure that the sensitivity level is in a range that allows stable activation and deactivation.
- Setting the sensitivity in a range allowing stable operation achieves higher reliability against changes in the operating environment generated after the sensitivity is set.



The red LED (OP.L) is the operation indicator.

In the L.ON (Light-ON) mode, the indicator is illuminated when a certain amount of light is detected.

In the D.ON (Dark-ON) mode, the indicator is illuminated

when a certain amount of light is not detected.

■ Chemical resistance of PFA (fluoroplastic)

Substance	PFA	Substance	PFA
Bunker A, B, C heavy oil		Mineral oil	
Aniline		Ethylene trichloride	
Acrylic nitrile	0	Bichromate of soda	
Asphalt		Barium nitrate	
Acetone		Silicon oil	
Alcohol		Vegetable oil	
Ammonia		Thinner	
Isooctane		Barium hydroxide	
Isobutyl alcohol		Phenol	
Isobutyl methyl ketone		Turbine oil	
Ethanol (ethyl alcohol)		Sodium carbonate	
Ether		Turpentine	
Ethylene glycol		Natural volatile oil	
Enamel paint	00000000	Kerosene	00000000000000
Ammonium chloride		Trichloroethane	
Calcium chloride	0	Trichloroethylene	
Sodium chloride		Toluene	
Barium chloride	0 0 0	Naphtha	
Chlorine		Lactic acid	
Gasoline		Nitrobenzene	×
Glass raw material		Fluorine Ferrosilicon	
Dilute hydrochloric acid Dilute caustic soda		Freon 11	0
Dilute caustic soda Dilute acetic acid	0	Propyl alcohol	
Dilute nitric acid		Propylene glycol	0
Dilute sulfuric acid		Benzene	
Citric acid		Methanol (methyl alcohol)	
Glycerin	0 0	Methyl violet	
Cresol		Water	
Chloroform		Carbon tetrachloride	
Light oil		Ammonium sulfate	
3	I	O : applicable × : inc	

○ : applicable × : inapplicable

Rating/Performance/Specification

	Model	PF-T3DS	PF-R03S	
	Detection method	Through-beam type	Diffuse-reflective type	
	Detecting distance	3m	300mm	
٥	Detection object	ϕ 20mm (Min.) Opaque	Standard detection object: 100 x 100 mm white drawing paper	
000	Power supply	12-24V DC ±10% / Ripple 10% max.		
2	Current consumption	Transmitter: 12 mA max.	20mA max.	
orfo	5	Receiver: 15 mA max.	20IIIA IIIax.	
Bating/performance	Operation mode	Dark-ON(*1)	Light-ON(*2)	
otir	Output mode	NPN open co	llector output	
α	- Output mode	Sink current 100 r	nA, 30 V DC max.	
	Response time	0.35ms max.		
	Hysteresis		10% max.	
	Operating angle	10° (at receiver)		
	Light source (wavelength)	Infrared LED (880 nm)		
	Indicator	Transmitter: power indicator (red LED) Receiver: operation indicator (red LED) Stability indicator (green LED)	Operation indicator (red LED) Stability indicator (green LED)	
2	Volume	Not provided (optional: sensitivity	adjustable with external volume)	
Chacification	Short circuit protection	Prov	vided	
ific	Case material	PFA (fluo	roplastic)	
90		Permanently attached cord 3m length		
U	Connection	(2 m protected with PFA tube)		
	Connection	Transmitter: 0.15 sq. 2 core	0.15 sq. 4 core	
		Receiver: 0.15 sq. 4 core	0.10 sq. + core	
	Mass	About 100 g (transmitter/receiver)	About 100g	
	Notes			

*1 Model PF-T3S for Light-ON mode *2 Model PF-R03DS for Dark-ON mode

Applicable power supply unit

PS Series High capacity of 200 mA at 12 VDC



(General-purpose type) PS3N

PS3N-SR

(Multifunctional type)

PS3F PS3F-SR

Environmental Specification

±	Ambient light	5,000 lx max.	
	Ambient temperature	-25 - +55°C (non-freezing/ non-condensing)	
mer	Protective structure	IP 67g (sensor body and cord up to 2 m from body) *	
nvironr	Vibration	10-55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction	
	Shock	500 m/s ² / 3 times each in 3 directions	
Ш	Dielectric withstanding	1,000 VAC for 1 minute	
	Insulation resistance	500 VDC, 20 M Ω or higher	

^{*}Indicates Class g oil resistance in addition to IEC Standard IP 67 protective structure.

Using In-line Volume Unit for PFA Sensor (optional)

In-line volume unit models provided with an operation mode selector switch, sensitivity adjustment volume and operation indicator are available for adjustment at a distant location.

Specification

Model: PF-V2 (NPN output)

PF-V2PN (PNP output)

Power supply: 12~24V DC ±10% / Ripple 10% max.

Output mode: Open collector output

100 mA (30 VDC) max. / Residual voltage: 1 V max.

Response time: 0.3ms max. Short circuit protection: Provided

Connection: permanently attached cord (2 m)

Sensor: ϕ 4 with four 0.2 mm2 cores

Power/output: ϕ 4 with three 0.2 mm2 cores

Case material: Polycarbonate Mass: Approx. 150g

Connection

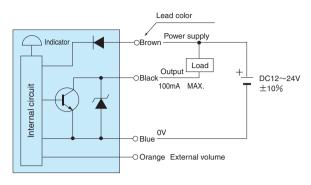
Connect to the receiver of a through-beam sensor or reflective-type sensor.



(Note) The volume unit and the cord are not covered with PFA (fluoroplastic) and should be used in normal atmosphere.

PF

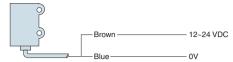
Input/Output Circuit and Connection



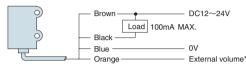
 The output transistor turns off when load short circuit or overload occurs.

Check the load and turn the power back on.

Through-beam type transmitter



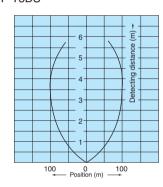
Through-beam type receiver and diffuse-reflective type



*Cut this lead off when not using the volume unit (model PF-V2) to leave it open and prevent it from touching other leads.

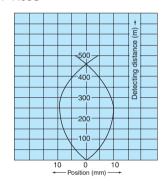
Directional characteristics(Typical Example)

PF-T3DS



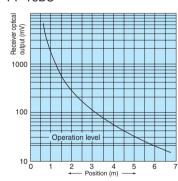
Activation area characteristics(Typical Example)

PF-R03S

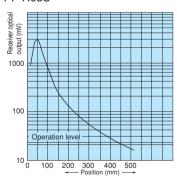


■ Distance-Output Characteristics (Typical Example)

PF-T3DS

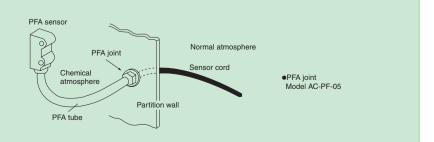


PF-R03S

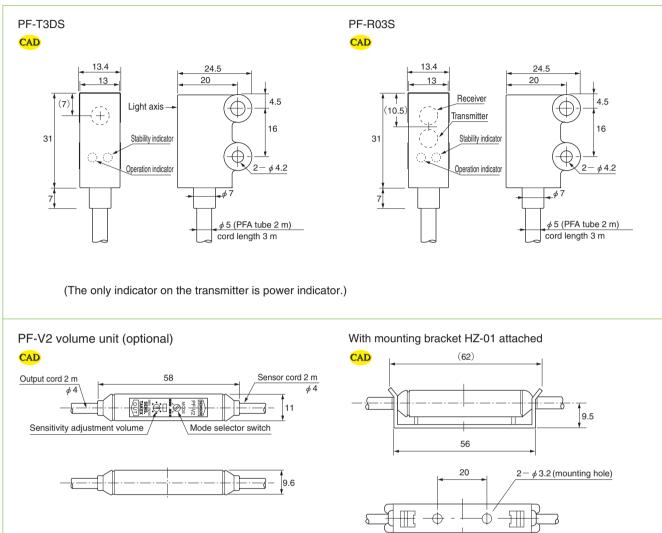


Hint on Handling (Reference Example)

• The sensor body and part of the cord is covered with PFA (fluoroplastic). A vinyl chloride cord extends out of the PFA tube (at 2 m from the sensor) and there is no sealing between the PFA tube and the cord. When using in chemical atmosphere, use the separately-available PFA joint, etc. in the partition wall between the chemical and normal atmospheres to route the cord.



Dimensions (in mm)



For Correct Use

- Do not bend the PFA tube into a radius of 30 mm or smaller.
- The tensile strength and bending strength of the sensor body and tube should be 0.2 N⋅m max.
- This product can be used under water at a depth of 50 cm at most. Be sure to refer to the chemical resistance performance table to check resistance before using the sensor in chemical solution.
- Do not use the sensor in hazardous environment requiring.
- To extend the cord, use wires of at least 0.3 mm². Do not extend the cord between the sensor and external volume.
- Use M4 screws to mount the sensor. When using stainless steel screws, the tightening torque should be 0.6 N·m max. For higher chemical resistance, use fluoroplastic (PFA) screws.
- While PFA (fluoroplastic) has resistance to chemicals, it is not completely chemical proof against fluorine or strongly acidic chemicals. The durability may vary depending on the permeability, erosiveness or temperature of chemicals and sensor operating condition.
- The electric operation guarantee period of the product is 1 year after delivery.
 The resistance to chemicals of PFA in terms of appearance is not covered since the durability may vary.

GAseries



- Simple operation of just pressing button
 Single touch can make adjustment for
 transparent object with high transmission
 Optical system capable of fine detection of
 transparent objects employed
- Reflector exclusively for transparent container detection

Tarnish-proof reflector especially designed for transparent objects employed

- Equipped with inverter light suppression circuit
 Faulty operation under inverter fluorescent lamps prevented
- IP 67 water resistance allowing washing

Type

Detection method	Detecting distance	Model	Operation mode	出力モード
	0.1-1m	GA-MT1R	Light-ON/ Dark-ON	NPN open collector
Reflector type		GA-MT1RPN	selectable (by teaching)	PNP open collector

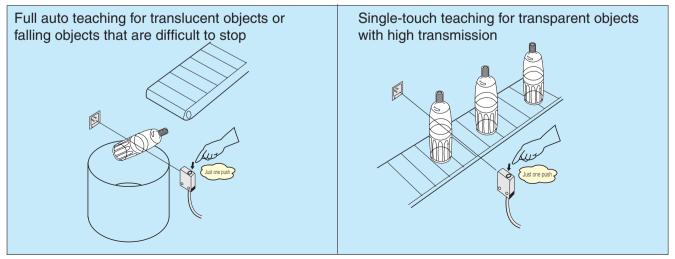
Optional Parts

Type Model		Description	
Mounting bracket	GA-B1	Vertical mounting bracket	
Woulding blacker	GA-B2	Horizontal mounting bracket	
	G-MSB1	Digid protective cover doubling on	
Protective cover	G-MTB1	Rigid protective cover doubling as mounting bracket.	
	G-K7B	mounting bracket.	
Reflector K-MT4		Accessory (when purchase separately)	

Mounting brackets do not come with sensors. Select and purchase appropriate models according to the mounting conditions

Sensitivity adjustment for transparent object detection difficult with conventional volume type made by single-touch operation

Sample Applications





Rating/Performance/Specification

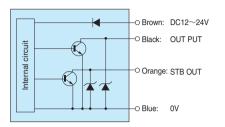
	Type		NPN output type	PNP output type	
	Model		GA-MT1R	GA-MT1RPN	
	Dete	ection method	Reflector type		
(I)	Dete	ecting distance	0.1-1m (with K-MT4 reflector)		
nce	Po	wer supply	12-24V DC ±10% / Ripple 10% max.		
ma	Curr	ent consumption	25mA max.	25mA max.	
for		Control output	NPN open collector	PNP open collector	
be	ge	Doting	Sink current 100 mA (30 VDC) max.	Source current 100 mA (30 VDC) max.	
ng/	Ĕ	Rating	Residual voltage: 1 V or less	Residual voltage: 1 V or less	
Rating/performance	Output mode	Stability output	NPN open collector	PNP open collector	
ш	Out	Rating	Sink current 50 mA (30 VDC) max.	Source current 50 mA (30 VDC) max.	
			Residual voltage: 1 V or less	Residual voltage: 2 V or less	
	Оре	eration mode	Light-ON/Dark-ON selectable		
	Response time		1ms max.		
	Li	ght source	Red LED (700 nm)		
	Indicator		Operation indicator (orange LED) Stability indicator (green LED)	
E	Setting button		For sensitivity setting and Light-ON/Dark-ON selection *1		
atic	Short circuit protection		Provided		
iji.	Material	Sensor	Lens: acrylic Ca	se: polycarbonate	
Specification	Mat	Reflector	Mirror: acrylic / Base	e: heat-resistant ABS	
S	С	onnection	Permanently attached cord (outer dimen	sion: dia. 4.2) 0.2 sq. 4 core 2 m length	
		Mass		Reflector: about 15 g	
		Notes	Special reflector (K-MT4), operation manual, explanation sticker, (Note) mounting bracket separately available		

*1 Factory settings

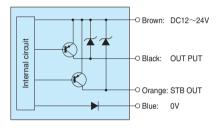
Sensitivity: Max. Mode: Dark-ON

Input/Output Circuit and Connection

NPN output GA-MT1R



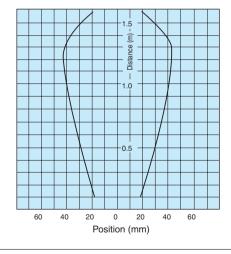
PNP output GA-MT1RPN



Environmental Specification

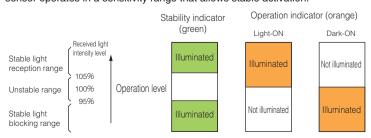
Ambient light	5,000 lx max.	
Ambient temperature	-25 - +55°C (non-freezing)	
Ambient humidity	35~85%RH (non-condensing)	
Protective structure	IP 67	
Vibration	10-55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction	
Shock	500 m/s² / 3 times each in 3 directions	
Dielectric withstanding	1,000 VAC for 1 minute	
Insulation resistance	500 VDC, 20 MΩ or higher	

Directional characteristics (Typical example)



Indicators

The figure below shows the illumination of operation and stability indicators for different received light intensity levels. Set the sensitivity in such a way that the sensor operates in a sensitivity range that allows stable activation.



Stability output

When seven consecutive detections have occurred with the intensity of light detected not reaching the stable light reception range, the stability signal is output.

GA-MT1R GA-MT1RPN

For Correct Use

Be sure to follow the instructions in the operation manual provided for correct use of the product.

Part names



This sensor only has one setting button and no sensitivity adjustment volume or selector switch. Light-ON/Dark-ON switching and sensitivity setting are handled with the setting button alone.

Enter the sensitivity setting mode or Light-ON/Dark-ON switching mode by pressing and holding down the button for a period of time as specified below:

Hold down setting button for 2-4 seconds

⇒Sensitivity setting mode

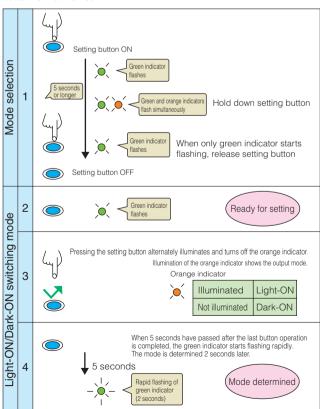
Hold down setting button for 5 seconds or longer
⇒Light-ON/Dark-ON switching mode

Switching between Light-ON/Dark-ON mode

The factory setting is Dark-ON mode.

Be sure to check and set either the Light-ON or Dark-ON mode before setting the sensitivity.

Enter the Light-ON/Dark-ON switching mode by pressing the setting button for 5 seconds or longer. While the button is operated, the state of the output before starting the operation of the button is maintained.



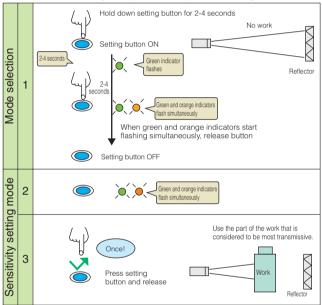
Sensitivity setting

The factory setting is maximum sensitivity. Adjust the sensitivity as required according to the state of the detection object or sensor mounting condition. Use the table below as guidelines:

Detection object	Sensitivity setting
Transparent object with high transmission such as PET bottle	Single-touch teaching-1
Translucent object such as milky white plastic case =	Single-touch teaching-2
Continuously moving object such as falling object	> Full auto teaching
Object that completely blocks light such as corrugated cardboard box	Maximum sensitivity setting

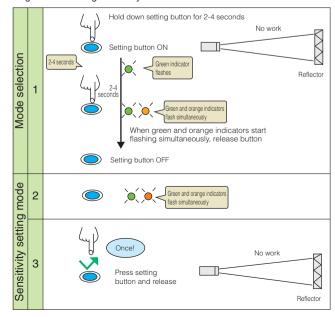
Single-touch teaching-1 transparent object with high transmission such as PET bottle

With the work removed, select the sensitivity setting mode. Then place the work at a given position and press the setting button once.



Single-touch teaching-2translucent object such as milky white plastic case

No work needs to be placed. Set the sensitivity while the light is received. Just a single operation of the button sets the optimum sensitivity for the given received light intensity.



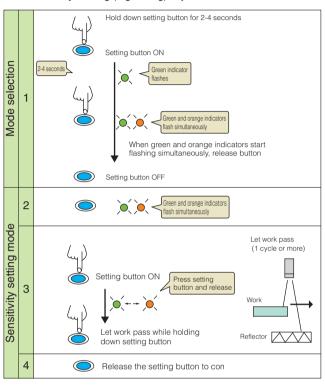
GA-MT1R GA-MT1RPN

For Correct Use

Be sure to follow the instructions in the operation manual provided for correct use of the product.

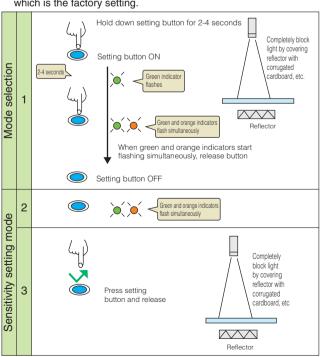
Full auto teaching

When it is not possible to make "no-work" state as in detection of continuously moving (e.g. falling) object



Maximum sensitivity setting

Enter the sensitivity setting mode with the light blocked and press the setting button once. The sensitivity is set at the maximum, which is the factory setting.



Installation

- Use the special reflector (K-MT4) that comes with the sensor.
 Using other types of reflector may degrade the performance of the product.
- No mounting bracket is provided. Purchase mounting brackets separately available according to the application.
- Sensor mounting

For securing the sensor, use screws of an adequate length. If the effective length of the screw to the sensor is too short, the thread of the sensor may be damaged.

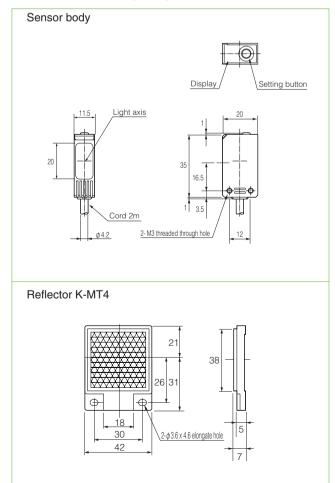
The mounting holes in the sensor are M3 threaded. Select M3 screws of an appropriate length so that the screw-in length to the body of the sensor will be at least 10 mm.

The tightening torque should be up to 0.5 N·m.

- Secure the sensor firmly on a solid base so that the sensor will not move when the setting button is pressed.
 Inadequate securing allowing the sensor to move when the setting button is pressed hampers accurate sensitivity setting.
- Make sure that the sensor and reflector are fixed before use.
 If the sensor or reflector is allowed to move, the operation may become unstable.

Rotation of the reflector with reference to the sensor is especially likely to cause problems such as chattering.

 If the ambient temperature is low enough for freezing to occur, the operation of the setting button may not feel smooth. In such a case, press hard until the indicator flashes.



NESseries

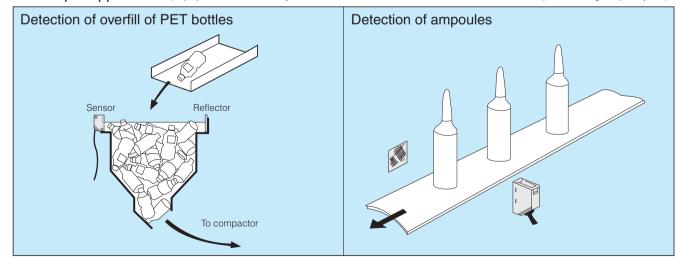


- Transparent objects such as PET bottles and ampoules detectable
- Teaching method for sensitivity ajustment is employed for less variation and automatic of optimum sensitivity, allowing reliable detection
 - Full auto teaching: set without stopping work
 - · Auto teaching: set with work stopped
 - External teaching: setting from a distant location

Type

Detection method	Detecting distance	Model	Operation mode	Output mode
Polarization	0.2~1m	NES-MT1	Light-ON	NPN
reflector type		NES-MT1D	Dark-ON	open collector

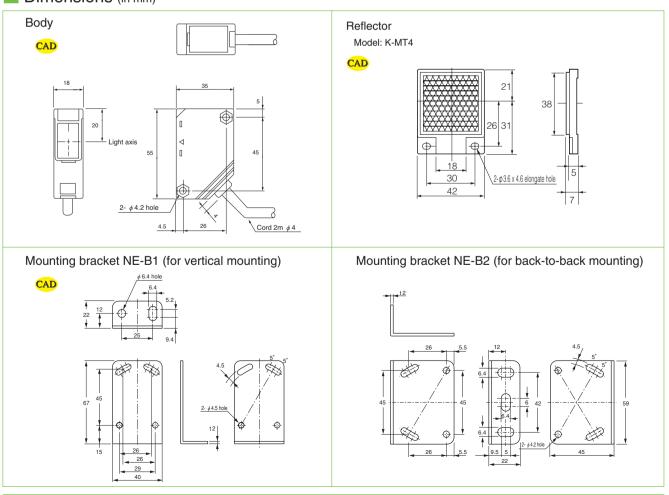
Sample Applications (In preparation for the unlikely event of unstable detection due to lens effect, etc., check the operation using sample objects.)





■ Rating/Performance/Specification

	Model	NES-MT1	NES-MT1D		
	Detection method	Polarization	Polarization reflector type		
	Detecting distance	0.2-1m (with K-MT4, reflector provided for sensor)			
ance	Power supply	12-24V [12-24V DC ±10%		
Rating/performance	Current consumption	30mA	max.		
erfc	Output mode	NPN open co	llector output		
d/gu	Output rating	Sink current 100 mA (30 VDC) m	ax. Residual voltage: 1 V or less		
Zatii	Operation mode	Light-ON	Dark-ON		
_	External teaching	No-voltage input (contact/non-contact)			
	Response time	1ms max.			
	Operating angle	30° (at reflector)			
	Light source (wavelength)	Red LED (700nm)			
	Indicator	Light reception indicator (Red LE	D) Stability indicator (green LED)		
_	Sensitivity adjustment	Full auto teaching/auto teaching with rotary	switch (provided) or external teaching input		
Specification	Protection circuit	Output short circuit protection,	reverse connection protection		
ific	Material	(Sensor) Lens: acrylic / (Case: heat-resistant ABS		
bec	ivialeriai	(Reflector) Mirror: acrylic /	Base: heat-resistant ABS		
0)	Connection	Permanently attached cord (outer dime	nsion: dia. 4) 0.2 sq. 4 core 2 m length		
	Mass	Sensor: about 150 g (including mou	nting bracket) / Reflector: about 15 g		
	Accessory	Mounting bracket, screwdriver for teach	ng, reflector (K-MT4), operation manual		



Long-distance polarization reflector type Embedded amplifier photo sensors

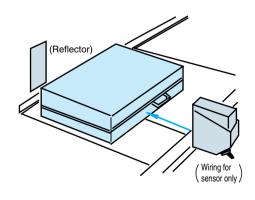


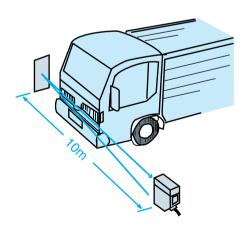
- Long distance detection up to 10 m achieved with reflector type
- Capable of reliably detecting mirror surface objects
- NPN/PNP output
- Stable operation checked in one view with stability indicator

Type

Detection method	Detecting distance	Model	Operation mode	Output mode	Power supply
Polarization reflector type	0.5~10m	NAL-M10RTC	Light-ON/ Dark-ON selectable (with switch)	NPN/PNP open collector output	DC12-24V

- Long detecting distance of 10 m ideal for detection of large objects and use on large conveyors
- Reflector type only requiring wiring for one unit contributing to cost reduction





- Polarization reflector capable of reliably detecting glossy objects
- Detecting condition checked at a glance with stability indicator

■ Rating/Performance/Specification

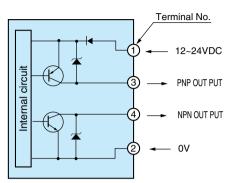
		Model	NAL-M10RTC	
	D	etection method	Polarization reflector type	
	Detecting distance		0.5~10m *1	
	[Detection object	Mirror-like objects, opaque objects	
ance		Power supply	12-24V DC ±10% / Ripple 10% max.	
rms	Cu	rrent consumption	30mA max.	
Rating/performance	Output mode		NPN/ PNP open collector (2 outputs) Rating; 100 mA (30 VDC) max. (NPN: sink current PNP: source current	
	Operation mode		Light-ON/Dark-ON selectable	
	Response time		0.5ms max.	
	Operating angle		30° (at reflector)	
	Light source		Red LED (670 nm)	
	Indicator		Operation indicator (orange LED) Stability indicator (green LED)	
_		Switch	Light-ON/Dark-ON selector switch	
Specification	Sho	ort circuit protection	Provided	
Sific		Case	Polycarbonate	
Spec	Material	Lens	Acrylic	
0)	Mate	Terminal cover	Polycarbonate	
		Mounting bracket	Stainless steel (SUS 304)	
		Connection	Terminal block (with M3.5 screws)	
		Mass	200 g max. (including mounting bracket)	

*With reflector model K-77 (accessory)

Environmental Specification

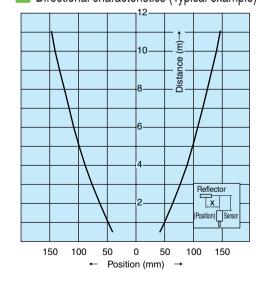
	Ambient light	Sunlight: illumination on light receiving surface 10,000 max.	
tion	Ambient light	Incandescent lamp: illumination on light receiving surface 3,000 max.	
specification	Ambient temperature	-25 - +55°C (non-freezing)	
oeci	Ambient humidity	35-85%RH (non-condensing)	
nt st	Protective structure	IP 67	
ıme	Vibration	10-55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction	
Environment	Shock	500 m/s² / 3 times each in 3 directions	
En	Dielectric withstanding	1,000 VAC for 1 minute	
	Insulation resistance	500 VDC, 20 M Ω or higher	

Input/Output Circuit and Connection Open collector output



The output transistor turns off when load short circuit or overload occurs. Check the load and turn the power back on.

Directional characteristics (Typical example)



For Correct Use

Operation panel



◆Operation indicator(O.P)

Orange LED illuminated when output is activated

◆Stability indicator(STB)

Green LED illuminated when the received light level is within the range allowing stable activation (120% or more of the operation level) or stable deactivation (80% or less of the operation level).

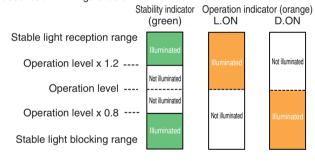
◆D.ON/L.ON selector switch

D.ON: output activated when light is blocked)

L.ON: (output activated when light is received)

Indicators

 The operation indicator (orange LED) and stability indicator (green LED) respectively show different received light intensity levels as described in the figure below.



- Repeat activation and deactivation to make sure that the sensitivity is in the stable activation/deactivation range.
- Setting within the stable range increases the reliability against variation of environment after setting.

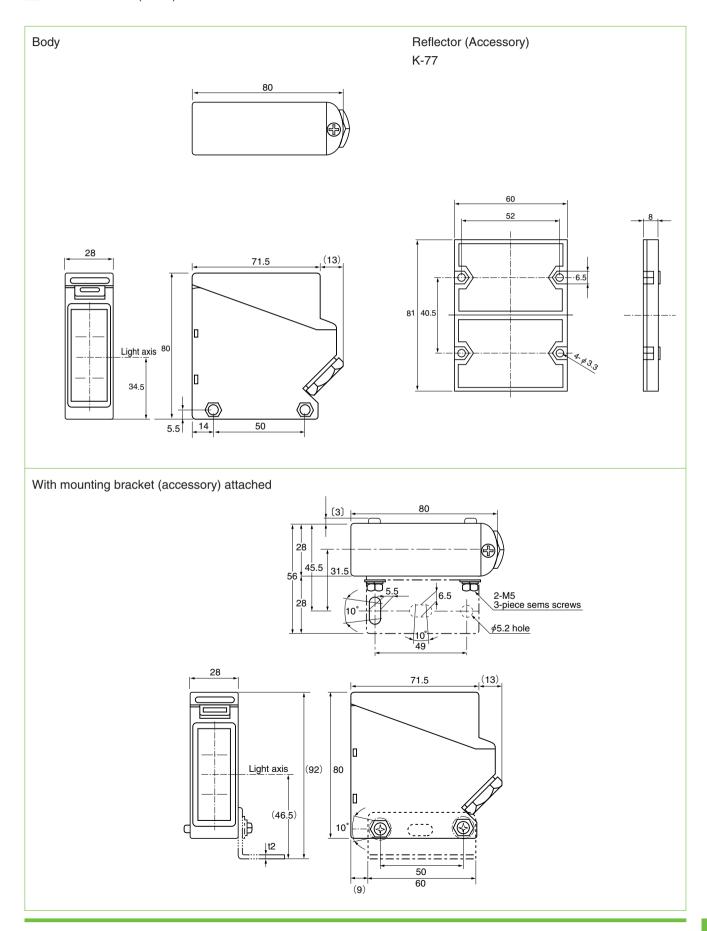
Detecting distances for different reflectors

The detecting distance depends on the reflector used

Reflector model	K-77	K-7	K-71	S-510G
Detecting distance	0.5~10m	0.5~7.5m	0.5~4m	0.5~6m
Remarks	Accessory	Optional	Optional	Optional



- Do not use the product for the protection of human body.
- When using the product for safety purposes, ensure safety with the control system as a whole as well as the detection.
- This product is not explosion proof.



NE-DC Series

Embedded Amplifier Photo Sensors



 Longest-in-class detecting distance (30 m with through-beam style sensor)

Through-beam type: 10 m, 30 m

Reflector type: 5 m

Diffuse-reflective type: 1 m

- Polarization reflector method reliably detects mirrorlike objects
- Red LED light source for ease of adjustment (through-beam 10 m model, polarization reflector model)
- External light emission stop input feature is convenient for checking "before" operation, prevention of interference and timing (through-beam type only)
- Polarization filter (separately available) for adjacent mounting of 2 units (through-beam type NE-T10RD-DC)

Type

Detection method	Detecting distance	Мо	Model		Output mode
Detection method	Detecting distance	Dark-ON mode	Light-ON mode	Light source	Output mode
		NE-T10RD-DC	NE-T10R-DC	Red LED	
1	10m	NE-T10RD-DC-J	NE-T10R-DC-J	Hed LLD	
Through-beam type		NE-T30D-DC	NE-T30-DC	Infrared LED	NPN/PNP
	30m	NE-T30D-DC-J	NE-T30-DC-J		
	0.03~5m	NE-M5RD-DC	NE-M5R-DC	Red LED	open collector
Polarization reflector type	0.00 3111	NE-M5RD-DC-J	NE-M5R-DC-J	neu LED	
11	1m	NE-R10D-DC	NE-R10-DC	Infrared LED	
Diffuse- reflective type	1111	NE-R10D-DC-J	NE-R10-DC-J	ililialed LED	

Optional Parts

Туре	Model	Applicable model	Description	
	NE-P3	NE-T10R (D) -DC	Hole diameter	Detecting distance
Pinhole plate	NE-P5	NE-T10H (D) -DC	Hole diameter ϕ 5	with plate attached
	NE-P5×1	NL-130 (D) -DC	Hole diameter 5 x 1mm	P.262
	K-71		Detecting distance	e: 0.03-2m
Reflector	K-2	NE-M5R(D)-DC	Detecting distance: 0.3-3m	
	S-510G		Detecting distance: 0.1-3m	
Interference	NE-PFA	NE-T10R(D)-DC	Longitudinal polari	zation filter
prevention filter	NE-PFB	NL-110H(D)-DC	Horizontal polarization filter	
Mounting bracket	NE-B1	All models	Vertical mounting	
wounting bracket	NE-B2	All Illodels	Back-to-back mounting	
Cord with M8	FBC-4R2S	Permanently attached cord	M8 straight (2m)	
connector	FBC-4R2L	with connector (-J) type	M8 angled	(2m)

NE-DC

Rating/Performance/Specification

	Model	NE-T10RD-DC ※	NE-T30D-DC ※	NE-M5RD-DC	NE-R10-DC
	Detection method	Through-l	Through-beam type		Diffuse-reflective type
	Detecting distance	10m max.	30m max.	0.03~5m max. *1	1m max. *2
	Detection object	/ 20mm (M	in \ Onegue	Mirror-like objects (Note)/opaque	Opaque objects/
	Detection object	φ 20111111 (101	lin.) Opaque	objects/translucent objects	translucent objects (Note 1)
Rating/performance	Power supply		12-24V DC ±10% / Ripple 10%		
orma	Current consumption	Transmitter: 5 mA max.	Transmitter: 20 mA max.	22mA max.	26mA max.
berfc		Receiver: 15 mA max.	Receiver: 15 mA max.	ΖΖΠΑ Παλ.	Zonia max.
ng/p	Output mode	NPN/PNP open collector 2 outputs			
Rati		Rating: 100 mA, (30 VDC) max. *3			
	Operation mode		Dark-ON *4		Light-ON *5
	Light emission stop function	Provided (no-	voltage input)		
	Response time	1ms max.		0.5ms max.	
	Hysteresis				10% max.
	Operating angle	3° (at receiver)	5° (at receiver)	30° (reflector)	

^{*}Set model No.

Transmitter model: NE-TL10R-DC

Receiver model: NE-TR10RD-DC

Transmitter model: NE-TL30-DC

Receiver model: NE-TR30D-DC

*2 With standard detection object (200 x 200 mm white drawing paper)

*4 Light-ON type available

^{*5} Dark-ON type available

	Light source	Red LED (700nm)	Infrared LED (880 nm)	Red LED (700nm)	Infrared LED (880 nm)
	Indicator	Transmitter: power in Receiver: operation in Stability indicator (gre	ndicator (red LED)	'	cator (red LED) for (green LED)
_	Volume			Sensitivity a	adjustment
ation	Material	Lens: Acrylic Case:		heat-resistant ABS	
Specification	Connection *7	Permanently attached cord Transmitter: 0.3 sq. 3 core 2 m length Receiver: 0.3 sq. 4core 2 m length		Permanently a	
	Mass	About 130 g (transmitter/receiver)		About	130 g
	Accessory *8			K-7 reflector	
	Notes	Light-ON type	Light-ON type	Light-ON type	Dark-ON type
	140103	Model NE-T10R-DC	Model NE-T30-DC	Model NE-M5R-DC	Model NE-R10D-DC

^{*6} Not provided for transmitter model NE-TL 10R-DC

Environmental Specification

		•
	Ambient light	10,000 lx max.
	Ambient temperature	-25 - +55°C (non-freezing)
ij	Ambient humidity	35~85%RH (non-condensing)
nme	Protective structure	IP66
Environment	Vibration	10-55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction
Ш	Shock	100 m/s2 / 3 times each in 3 directions
	Dielectric withstanding	500 VAC for 1 minute
	Insulation resistance	500 VDC, 20 MΩ or higher

(Note) Some materials do not allow stable detection. Mirror-like objects wrapped in transparent film, glossy objects, laminated aluminum nameplates, etc., may inherently affect polarization. In such cases, the polarized waves of the sensor may be disturbed, which causes unstable detection.

(Note 1) Detecting objects with higher transmission may offer shorter detecting distances.

^{*1} With reflector model K-7 (accessory)

^{*3} NPN: sink current; PNP: source current

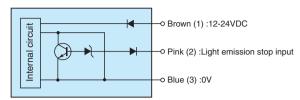
^{*7} Connector type separately available (-J type: cord length 0.3 m)

^{*8} Mounting brackets are not provided. See Dimensions.

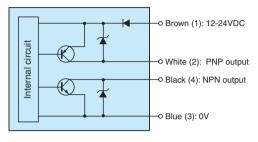
NE-DC

Input/Output Circuit and Connection

Transmitter



Receiver/sensor

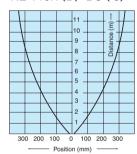


Connection Through-beam type receiver Transmitter Polarization reflector type Diffuse-reflective type Black (4): NPN OUT Light emission stop input White (2): PNP OUT Pink (2) :TEST INPUT Brown (1): 12-24 VDC Brown (1): 12-24 VDC

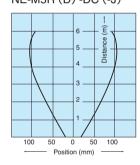
- The output transistor turns off when load short circuit or overload occurs. Check the load and turn the power back on.
- Circled numbers show connector pin Nos. for -J type.

Directional characteristics (Typical Example)

NE-T10R (D) -DC (-J)



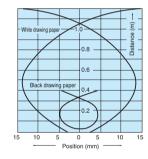
NE-M5R (D) -DC (-J)



Activation area characteristics (Typical example)

NE-R10 (D) -DC (-J)

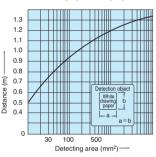
Blue (3): 0V



Distance-area characteristics (Typical example)

Blue (3): 0V

NE-R10 (D) -DC (-J)



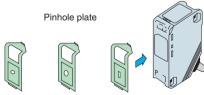
Pinhole Plate (optional)

Pinhole plates as described below are available for through-beam type models. Use of pinhole plates reduces the smallest allowable detection object diameter and activation area.

Detecting Distances for Different Reflectors (Model: NE-M5RD-DC)

The detecting distance depends on the reflector used.

Reflector model	Detecting distance
K-7 (Accessory)	0.03-5m
K-71	0.03-2m
K-2	0.1-3m
S-510G	0.1-3m



NE-P5×1

(5×1mm)

Detecting distance with plates attached to both transmitter and receiver

	Sensor model	Pinhole plate model			
	Sensor model	NE-P3	NE-P5	NE-P5×1	
	NE-T10R(D)-DC	1m	3m	0.7m	
	NE-T30(D)-DC	3m	7m	2m	
	(2)	0			

Indicators

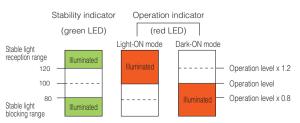
NF-P3

 $(\phi 3)$

NE-P5

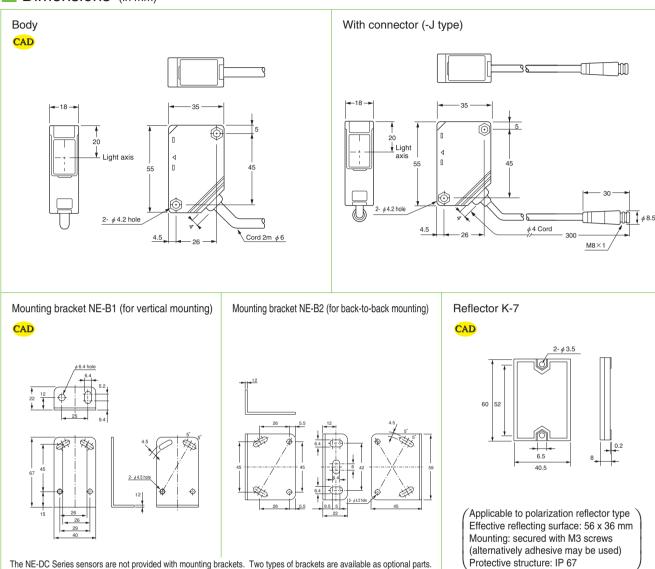
 $(\phi 5)$

- · Light axis alignment and sensitivity adjustment are simple. Setting within the stable range increases the reliability against variation of environment after setting.
- The operation indicator (red LED) and stability indicator (green LED) respectively show different received light intensity levels as described in the figure.



NE-D

Dimensions (in mm)



Attachment of Interference Prevention Filter (optional)

The NE-DC Series sensors are not provided with mounting brackets. Two types of brackets are available as optional parts.

Model

NE-PFA (longitudinal type) NE-PFB (horizontal type)

Use of filters allows adjacent mounting of through-beam type sensors. For adjacent mounting of two sensors, use the longitudinal type for one pair and horizontal type for the other.



Insert into grooves at the top and bottom of the lens side of the transmitter and receiver.

Attach NE-PFA 10 Attach NE-PFB

May be attached to model NE-T10R (D). The detecting distance with the filters attached is up to 5 m.

For Correct Use

- Avoid turning power "On and Off" consecutively.
- Do not use output signals in the transient condition while the power is
- The tightening torque for the sensor body and mounting bracket should not exceed 0.8 N·m max.
- While this product has a waterproof structure (IP 66), do not use in a place subject to constant water spray or under water. Also note that use in a place subject to corrosive gas, vibration/shock or direct splash of oils/chemicals may lead to faulty operation.

NEFseries



 Highly resistant to inverter noise as well as disturbing light including inverter fluorescent lamps or other light emitters Reasonably priced

Photo sensor ideal for use in places subject to:

- Lighting including fluorescent and mercury lamps
- Light emission of other photo sensors
- Various types of intense light such as the installation on carriages and vehicles

Type

Detection method	Detecting distance	Model	Operation mode	Output mode
Through-beam type	10m	NEF-T10RD	Dark-ON	NPN/PNP
Polarization reflector type	0.03-5m	NEF-M5RD	Dark-ON	open collector
Diffuse-reflective type	1m	NEF-R50	Light-ON	(2 output)

Even more ensured stable detection

Stable detection of small objects

Pinhole plate (optional)



Model NE-P3 (φ 3)



Pinhole plate





Model NE-P5 x1 (5×1mm)

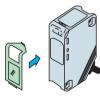
Detecting distance with plate attached (to both transmitter and receiver)

Model	NE-P3	NE-P5	NE-P5×1
Hole diameter	φ3	φ5	5×1
Detecting distance	1 m	3m	0.7m

Adjacent mounting of throughbeam type sensors

• Interference prevention filter (optional)

Interference prevention filter Model NE-PFA (longitudinal type) Model NE-PFB (horizontal type)



Type

Product name	Model	Description	
	NE-P3	Hole diameter 3mm	
Pinhole plate	NE-P5	Hole diameter 5mm	
	NE-P5×1	Hole diameter 5 x 1mm	
Interference NE-PFA		Longitudinal polarization filter	
prevention filter NE-PFB		Horizontal polarization filter	

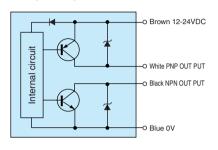
Rating/Performance/Specification

	Мо	del	NEF-T10RD	NEF-M5RD	NEF-R50	
	Detection	method	Through-beam type	Polarization reflector type	Diffuse-reflective type	
	Detecting distance		10 max.	0.03~5m max. *	1m max.	
9	Detection object		φ 20mm (Min.) Opaque	Mirror-like objects /opaque objects	Opaque objects/translucent objects	
lan	Power supply		12-24V DC ±10% / Ripple 10%			
Rating/performance	Current consumption		Transmitter: 30mA max. Receiver: 25mA max. 40mA max.			
g/g	Output	mode	NPI	N/ PNP open collector (2 outp	uts)	
tin		output	NPN: sink current 100 mA (30	0 VDC) max. PNP: source cu	ırrent 100 mA (30 VDC) max.	
E E	Operation mode		Dark	r-ON	Light-ON	
	Response time			5ms max		
	Hysteresis				10 % max.	
	-	ng angle	3° (at receiver)	30° (at reflector)		
	Light source (Light wavelength)		Red LED	(700 nm)	Infrared LED (880 nm)	
	Indicator		Transmitter: power indicator (red LED) Receiver: operation indicator (orange LED) Stability indicator (green LED)	Operation indicator (grange LED)		
	Volume (VR)		SENS: sensitivity adjustment (on receiver for through-beam type)			
_	Short circuit protection		Provided			
tior	Material Case		Heat-resistant ABS			
fica	Material	Lens		Acrylic		
Specification	Connection		Permanently attached cord (outer dimension: dia. 6) Transmitter of through-beam type: 0.3 sq. 2 core 2 m length (gi Receiver of through-beam type: 0.2 sq. 4 core 2 m length (black)			
	Mass		Transmitter: About 130 g Receiver: About 150 g	About 150 g		
	Accessory		K-7 reflector Screwdriver for adjustment, mounting bracket, operation manual			
	Note		*With K-7 reflector (accessory)			

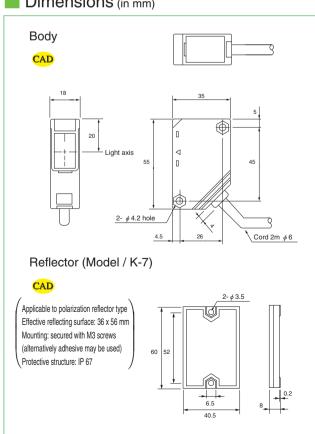
■ Environmental Specification

		Ambient light	10,000 max.	
		Ambient temperature	-25 - +55°C (non-freezing)	
ent	ent	Ambient humidity	35-85%RH (non-condensing)	
	nu	Protective structure	IP 66	
	iro	Vibration	10-55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction	
	Environment	Shock	100 m/s2 / 3 times each in 3 directions	
	Dielectric withstanding	1000 VAC for 1 minute		
	Insulation resistance	500 VDC, 20 MΩ or higher		

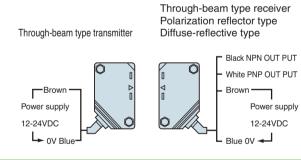
Input/Output Circuit and Connection

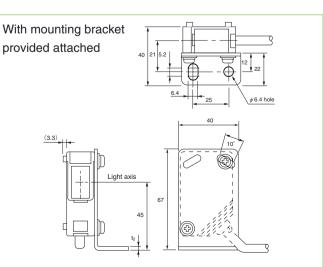


Dimensions (in mm)



Connection





PU ASseries

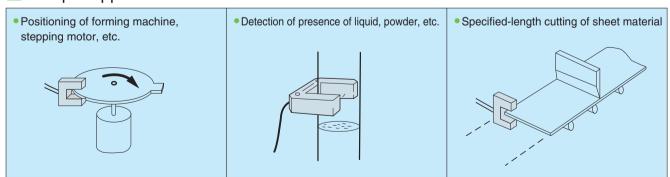


- No light axis alignment necessary
- Ideal for position checking or of stacker crane in automatic warehouse

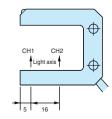
Type

Detection method	Detecting distance	Model		Operation mode	Output mada
Detection method	Detecting distance	NPN type	PNP type	Operation mode	Output mode
	5 mm fixed	PU5		Light-ON/ Dark-ON	NPN open collector
	10 mm fixed	PU10		selectable (depending on cable)	Current output/ voltage output
U-shaped	19 mm fixed	AS-U20		Light-ON	
through- beam type	13 mm niced	AS-U20D		Dark-ON	
	25 mm fixed	AS-U25		Light-ON	NPN open
	25 11111 11860	AS-U25D		Dark-ON	collector
	30 mm fixed	AS-U30	AS-U30PN	Light-ON	
		AS-U30D	AS-U30DPN	Dark-ON	

Sample Applications



2-channel output type
 2-channel output types are separately available
 Model AS-U25-2
 Model AS-U25D-2





■ Rating/Performance/Specification

	Мо	del	PU5	PU10	AS-U20(D)	AS-U25(D)	AS-U30(D)
	Detection method			Through-beam type (U-shaped)			
	Detecting distance		5 mm fixed	10 mm fixed	19 mm fixed	25 mm fixed	30 mm fixed
Rating/performance	Detection object φ 1mm		φ 1mm (Min.) Opaque		φ 2mm (Min.) Opaque)	φ 5mm (Min.) Opaque
	Power supply			12-24V DC ±10% / Ripple 10% max.			
	Current consumption		20mA max.	45mA max.	25mA max.		35mA max.
	Output mode		NPN open collector Sink current 100 mA (30 VDC) max.	Current output Sink current 75 mA (48 VDC) voltage output Output impedance: 4.7 kΩ	NPN open collector*2 Rating: sink current 100 mA (30 VDC) max.		
	Operation mode Light-ON/Da		Light-ON/Dark-	ON (2 outputs)	ON (2 outputs) Dark-ON*1		
	Response time		200 μs max.	50 μs max.	0.35ms max.		0.5ms max.
	Light source (wavelength) Infra		Infrared LED (910 nm)	Infrared LED (940 nm)	Red LED (650nm)		Red LED (950nm)
	Indicator		Light reception indicator (red LED)		Operation indic	cator (red LED)	Operation indicator
					Stability indicator (green LED)		(red LED)
	Short circuit protection ———					Provided	
	Material Case		Polycarbonate	Polycarbonate	Heat-resi	stant ABS	ABS
on	Material	Lens	Polycarbonate	Acrylic	Heat-lesistant ADS		
Specification	Connection (outer dir		Permanently attached cord (outer dimension: dia. 5 x 3) 0.14 sq. 4 core 1 m length	Permanently attached cord (outer dimension: dia. 6.2) 0.3 sq. 4 core 3 m length	,	d (outer dimension: dia. 4) re 2 m length	Permanently attached cord (outer dimension: dia. 4.2) 0.3 sq. 3 core 2 m length
Sp	Ма	ass	About 40g	About 220g	About 55g	About 60g	About 140g
	Notes AS-U20, a		*1 Light-ON type sep AS-U20, as-U25, *2 PNP output type : AS-U30PN, AS-U	AS-U30 separately available			

■ Environmental Specification

	Ambient temperature	AS series: -25 - +55°C (non-freezing)			
	_	Ambient temperature	PU series: -10 - +55°C		
	neu	Ambient humidity	35-85%RH (non-condensing)		
	Environment	Protective structure	IP67 (IP 40 for PU10)		
	invi	Vibration	10-55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction		
	ш	Shock	500 m/s2 / 3 times each in 3 directions		
		Insulation resistance	500 VDC, 100 MΩ higher		

Applicable power supply unit PS Series

High capacity of 200 mA at 12 VDC



(General-purpose type)

PS3N-SR

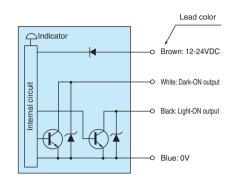
(Multifunctional type) PS3F

PS3F-SR

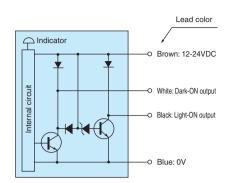
PU AS

Input/Output Circuit and Connection

PU5



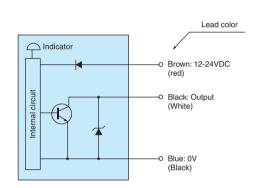
PU10



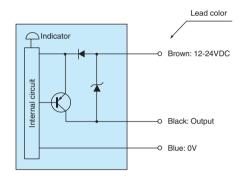
*Insulate any unused output lead.

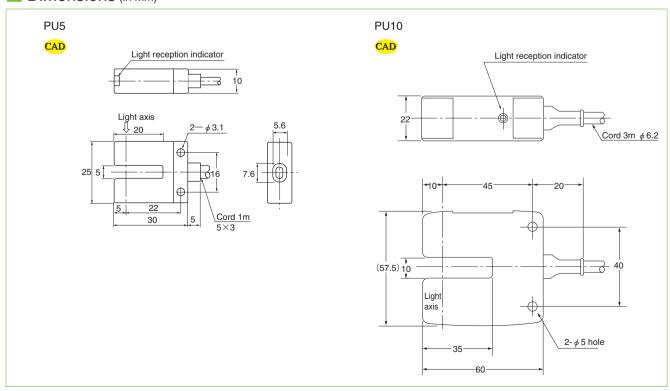
*Insulate any unused output lead

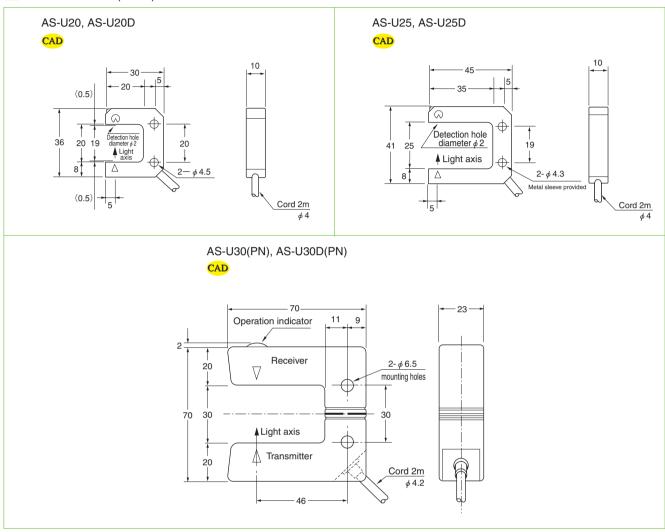
AS-U20 AS-U20D AS-U25 AS-U25D AS-U30 AS-U30D



AS-U30PN AS-U30DPN







Reflector

