IDEC

Think Automation and beyond...

NEW
Transparent &
Class 1 Laser
Models

IDEC SA1E Photoelectric Sensors

SA1E Sensors

Photoelectric sensors

Photoelectric sensors send a beam of light to detect the presence of target objects, generally utilizing an emitter and receiver for this function. Photoelectric technology is ideal for industries such as material handling, packaging, electronics and semiconductor manufacturing, food and beverage, and pharmaceutical.

IDEC SA1E photoelectric sensors

Accurate detection of target objects is imperative for control systems. With reliable object detection and repeatability, you can have fewer false alarms and less product rejection. Designed to function consistently over time and tolerate harsh industrial environments, the IDEC SA1E photoelectric sensors are completely assembled using precise robotic technology to produce a reliable, accurate and durable product. No matter how demanding your application is, there's an SA1E photoelectric sensor with the features to suit your requirements and a low price to fit your budget!

SA1E photoelectric sensors come in an easy-to-install, compact housing with a choice of NPN or PNP outputs, as well as a choice of operation modes. In Light ON mode, the output is energized when the sensor detects light. In Dark ON mode, the output is energized when the sensor detects dark (the absence of light).

Highlights:

- Fully automated assembly
- High-speed response
- Subminiature design
- Cable and M8 Quick connector models available
- IP67 rated

Available Sensing Modes:

10.8mm wide
31.5mm high
19.5mm deep

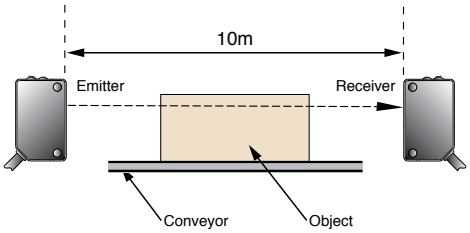
Through-beam

Benefits of through-beam sensors:

- Suitable for dirty environments
- Offers precise detection
- Detects target objects up to 30 meters away (laser models)

IDEC SA1E through-beam photoelectric sensors are configured with the emitter and detector placed facing each other, perpendicular to the path of the target object. Light is sent from the emitter to the receiver, and the target object is detected when the beam is broken.

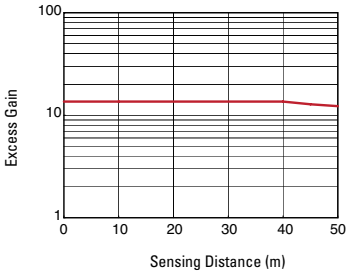
Through-beam



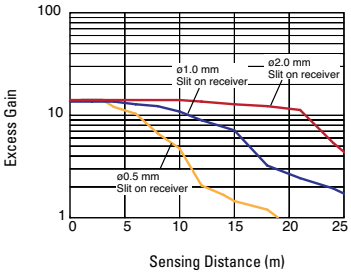
Sensing Method	Sensing Range	Connection	Cable Length	Operation Mode	Part Number	
					NPN Output	PNP Output
Through-Beam Infrared LED	20m*	Cable	2m	Light ON	SA1E-TN1-2M	SA1E-TP1-2M
				Dark ON	SA1E-TN2-2M	SA1E-TP2-2M
		M8 Connector	2m or 5m (Order Separately)	Light ON	SA1E-TN1C	SA1E-TP1C
				Dark ON	SA1E-TN2C	SA1E-TP2C
Through-Beam Class 1 Laser	30m	Cable	2m	Light ON/Dark ON	SA1E-LTN3-2M	SA1E-LTP3-2M
		M8 Connector	–	Light ON/Dark ON	SA1E-LTN3C	SA1E-LTP3C

*Without Sensitivity Adjustment: 1. SA1E-TN2-NA-2M, 2. SA1E-TP2-NA-2M (15 meter range)

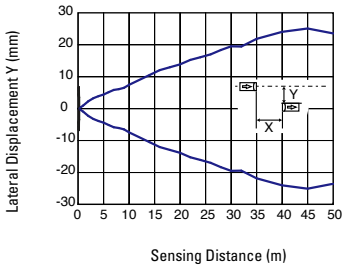
Excess Gain (without slit)



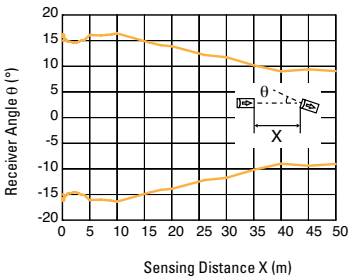
Excess Gain (with round slit)



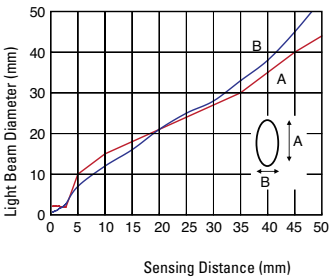
Lateral Displacement (without slit)



Angle (without slit)

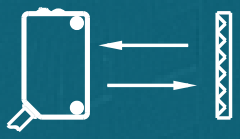


Light Beam Diameter**



**Sensing distance below 3 m: Defined as $1/e^2$ (13.5%) of the center intensity
Sensing distance over 3 m: Reference value (visual inspection)

Polarized retro-reflective

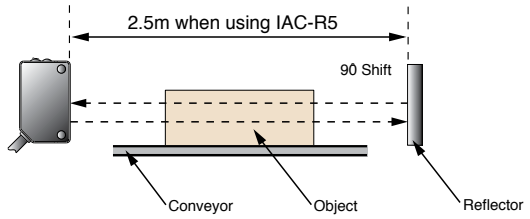


Benefits of polarized retro-reflective sensors:

- Emitter and detector in one unit
- Polarized beam detects matte and mirrored objects
- Detects reflective objects

IDEC SA1E polarized retro-reflective sensors are configured with the emitter and detector housed in one unit. Light is sent from the sensor's emitter to a reflector, which then reflects the light back to the sensor's receiver. The biggest advantage of using this type of sensor is that wiring is very easy due to the fact you only have one unit to wire. TThese sensors are also ideal for detecting mirror-like objects.

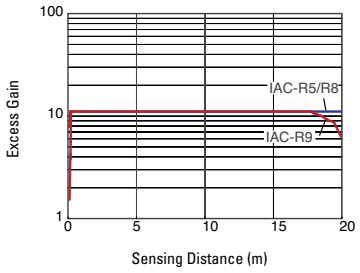
Polarized retro-reflective



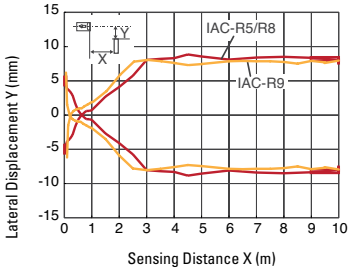
Sensing Method	Sensing Range	Connection	Cable Length	Operation Mode	Part Number	
					NPN Output	PNP Output
Polarized Retro-reflective Red LED	5m when using IAC-R5 5m when using IAC-R8 3m when using IAC-R6 1.3m when using IAC-RS1 2m when using IAC-RS2 1.6m when using IAC-R7	Cable	2m	Light ON	SA1E-PN1-2M	SA1E-PP1-2M
				Dark ON	SA1E-PN2-2M[1]	SA1E-PP2-2M[2]
		M8 Connector	2m or 5m (Order Separately)	Light ON	SA1E-PN1C	SA1E-PP1C
				Dark ON	SA1E-PN2C	SA1E-PP2C
Polarized Retro-reflective Class 1 Laser w/Sensing Range Adjustment	10m	Cable	2m	Light ON/Dark ON	SA1E-LPN3-2M	SA1E-LPP3-2M
		M8 Connector	–		SA1E-LPN3C	SA1E-LPP3C

Without Sensitivity Adjustment: 1. SA1E-PN2-NA-2M, 2. SA1E-PP2-NA-2M

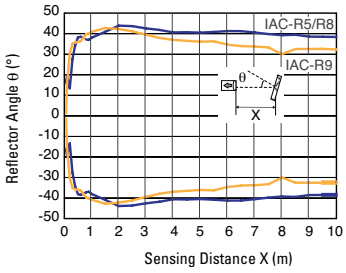
Excess Gain



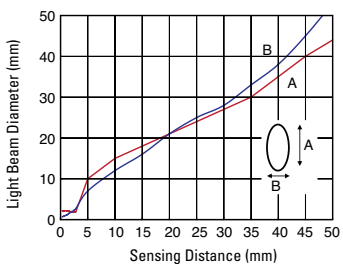
Lateral Displacement



Angle



Light Beam Diameter*



*Sensing distance below 3 m: Defined as $1/e^2$ (13.5%) of the center intensity
Sensing distance over 3 m: Reference value (visual inspection)

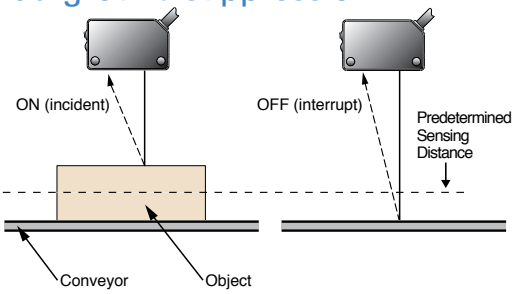
Background suppression

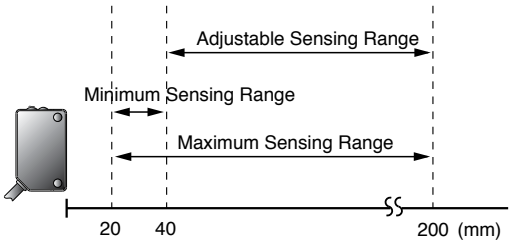
Benefits of background suppression (fixed field) sensors:

- Reliable object recognition
- Fewer false alarms and product rejections
- Higher level of precision and repeatability

IDEC SA1E background suppression sensors determine the presence of target objects based on a predetermined sensing distance. This means objects beyond the cut-off range won't be detected, and ensures that target objects can be accurately and reliably detected regardless of color or reflectivity.

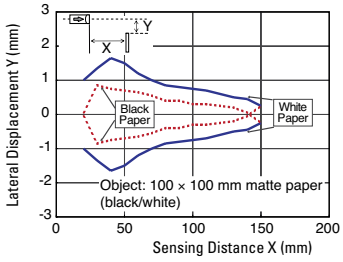
Background suppression



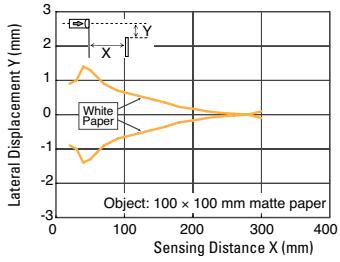


Sensing Method	Sensing Range	Connection	Cable Length	Operation Mode	Part Number	
					NPN Output	PNP Output
Background suppression Red LED w/Sensing Range Adjustment	20 to 200mm (Adjustable Sensing Range 40 to 200mm)	Cable	2m	Light ON	SA1E-BN1-2M	SA1E-BP1-2M
				Dark ON	SA1E-BN2-2M	SA1E-BP2-2M
		M8 Connector	2m or 5m (Order Separately)	Light ON	SA1E-BN1C	SA1E-BP1C
				Dark ON	SA1E-BN2C	SA1E-BP2C
Background suppression Class 1 Laser w/Sensing Range Adjustment	20 to 300mm (Adjustable Sensing Range 40 to 300mm)	Cable	2m	Light ON/Dark ON	SA1E-LBN3-2M	SA1E-LBP3-2M
		M8 Connector	–	Light ON/Dark ON	SA1E-LBN3C	SA1E-LBP3C

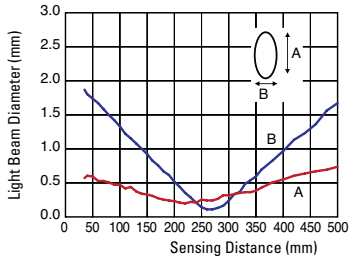
Lateral Displacement (Preset 150mm)



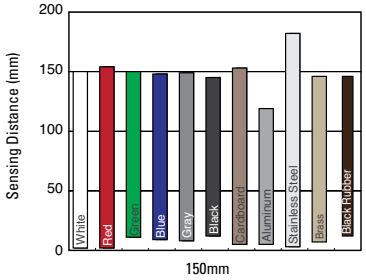
Lateral Displacement (Preset 300mm)



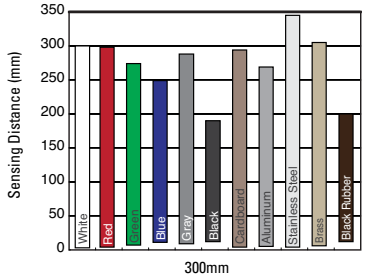
Light Beam Diameter*



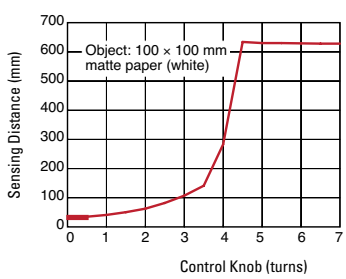
Color Matte Paper and Other Materials (Preset 150mm)**



Color Matte Paper and Other Materials (Preset 300mm)**



Control Knob vs. Sensing Distance



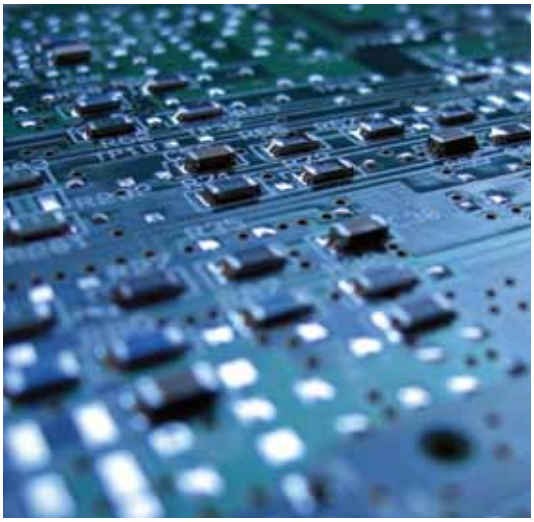
*Light beam diameter: Defined as 1/e2 (13.5%) of the center intensity
**Comparison of sensing distance when set to detect white matte paper (100 × 100 mm)

Convergent

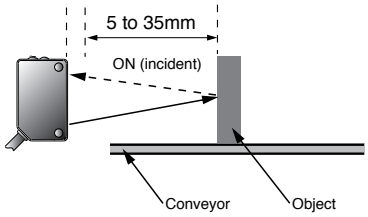
Benefits of convergent (point focus) sensors:

- Ideal for objects with low reflectivity and varying colors
- Reliable detection of objects with a small profile
- Accurate short distance sensing, while ignoring the background

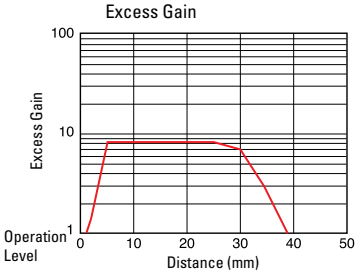
IDEC SA1E convergent sensors focus the emitter and receiver to an exact point in front of the sensor. This method of sensing provides an intense and well-defined sensing area. This allows for detection of transparent objects.

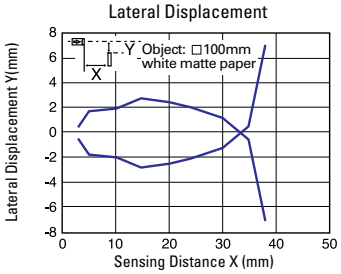


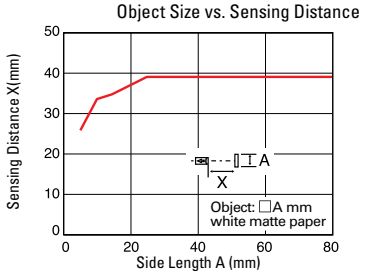
Convergent



Sensing Method	Sensing Range	Connection	Cable Length	Operation Mode	Part Number	
					NPN Output	PNP Output
Convergent Infrared LED	5 to 35mm	Cable	2m	Light ON	SA1E-GN1-2M	SA1E-GP1-2M
				Dark ON	SA1E-GN2-2M	SA1E-GP2-2M
		Connector	2m or 5m (Order Separately)	Light ON	SA1E-GN1C	SA1E-GP1C
				Dark ON	SA1E-GN2C	SA1E-GP2C







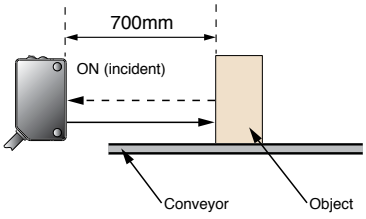
Diffuse-reflective

Benefits of diffuse-reflective sensors:

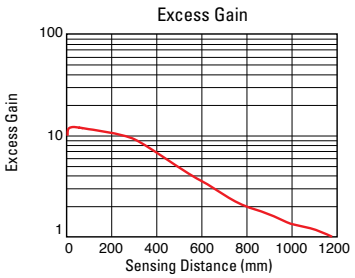
- Emitter and detector in one unit
- Easy alignment and a 700mm maximum sensing range
- Detects transparent or translucent objects

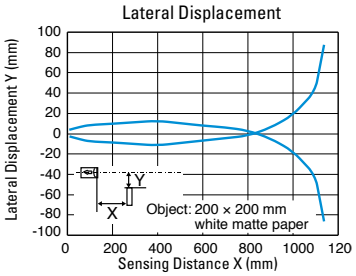
IDEC SA1E diffuse-reflective sensors have the emitter and receiver built into a single unit that allows these sensors to rely upon reflection from the surface of the target object. Light is sent from the sensor's emitter to the target objects and bounced back to the sensor's receiver. Diffuse sensing is the premiere choice for materials that are translucent to light. These sensors are also ideal for many types of applications because they are easy to setup and use. You only need to wire one unit and there is no need for a separate receiver or reflector.

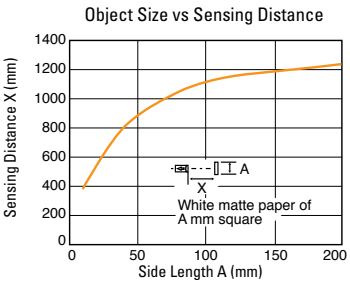
Diffuse-reflective



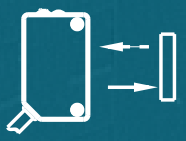
Sensing Method	Sensing Range	Connection	Cable Length	Operation Mode	Part Number	
					NPN Output	PNP Output
Diffuse-reflective Infrared LED	700mm	Cable	2m	Light ON	SA1E-DN1-2M	SA1E-DP1-2M
				Dark ON	SA1E-DN2-2M	SA1E-DP2-2M
		M8 Connector	2m or 5m (Order Separately)	Light ON	SA1E-DN1C	SA1E-DP1C
				Dark ON	SA1E-DN2C	SA1E-DP2C







Small-beam reflective

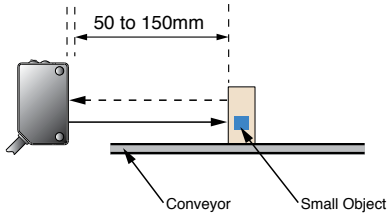


Benefits of small-beam reflective sensors:

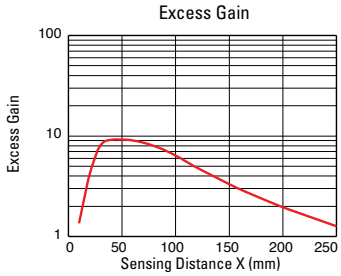
- Emitter and detector in one unit
- Narrow beam ignores objects around target
- Detects small objects

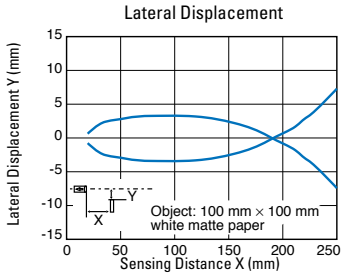
IDEC SA1E small-beam reflective sensors operate like diffuse-reflective, the emitter and receiver are contained in the same housing. However, the small light beam generated by these sensors can reach a target in a narrow space at a distance up to 150mm. This makes them an ideal sensor for detecting very small objects, within a narrow field of vision.

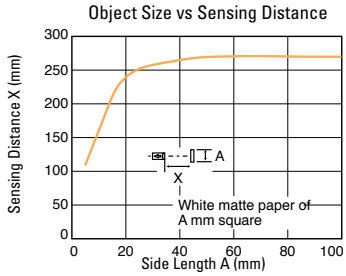
Small-beam reflective



Sensing Method	Sensing Range	Connection	Cable Length	Operation Mode	Part Number	
					NPN Output	PNP Output
Small-Beam Reflective Red LED	50 to 150mm	Cable	2m	Light ON	SA1E-NN1-2M	SA1E-NP1-2M
				Dark ON	SA1E-NN2-2M	SA1E-NP2-2M
		M8 Connector	2m or 5m (Order Separately)	Light ON	SA1E-NN1C	SA1E-NP1C
				Dark ON	SA1E-NN2C	SA1E-NP2C







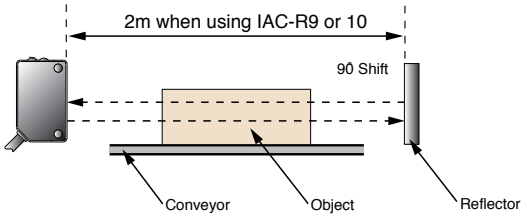
Transparent

Benefits of transparent sensors:

- Ideal for transparent, opaque, mirror-like objects
- Long sensing range - up to 2m
- Quick reponse time - 500µs

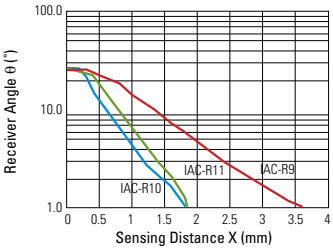
IDEC SA1E transparent Class1 laser sensors feature a coaxial optic and narrow beam to ensure stable detection. They can reliably solve challenging applications such as sensing of plastic, glass and other transparent bottles, transparent film for packaging, and wafer displacement.

Transparent

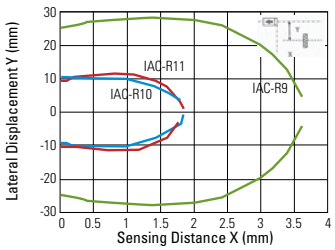


Sensing Method	Sensing Range	Connection	Cable Length	Operation Mode	Part Number	
					NPN Output	PNP Output
Coaxial Polarized Retro-reflective Red LED w/Sensitivity Adjustment	2m when using IAC-R9 2m when using IAC-R10 1m when using IAC-R11	Cable	2m	Light ON	SA1E-XN1-2M	SA1E-XP1-2M
				Dark ON	SA1E-XN2-2M	SA1E-XP2-2M
		M8 Connector	–	Light ON	SA1E-XN1C	SA1E-XP1C
				Dark ON	SA1E-XN2C	SA1E-XP2C

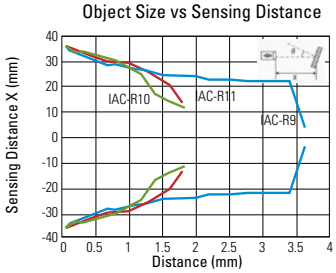
Excess Gain



Lateral Displacement



Object Size vs Sensing Distance



Accessories

Reflectors (for polarized retro-reflective sensors)

Item		Part Number
	Standard reflector	IAC-R5
	Small reflector	IAC-R6
	Large reflector	IAC-R8
	Narrow (rear/side mounting)	IAC-R7M
	Narrow (side mounting)	IAC-R7S
	Narrow (rear mounting)	IAC-R7B
	Tape (35 x 40mm)	IAC-RS1
	Tape (70 x 80mm)	IAC-RS2
	Standard	IAC-R9*
	Small	IAC-R10*
	Ultra-small	IAC-R11*

*for use with SA1E-X Brackets

Mounting Brackets

Item		Part Number
	Vertical mounting bracket	SA9Z-K01
	Horizontal mounting bracket	SA9Z-K02
	Cover mounting bracket	SA9Z-K03
	Back mounting bracket	SA9Z-K04
	Reflector mounting bracket	IAC-L2
	Reflector mounting bracket	IAC-L3
		IAC-L5

Slits (for through-beam sensors)

Item		Slit Size	Part Number	Min. Order Qty
	Vertical slit	0.5mm x 18mm	SA9Z-S06	2
		1.0mm x 18mm	SA9Z-S07	
		2.0mm x 18mm	SA9Z-S08	
	Horizontal slit	0.5mm x 6.5mm	SA9Z-S09	
		1.0mm x 6.5mm	SA9Z-S10	
		2.0mm x 6.5mm	SA9Z-S11	
	Round slit	ø0.5mm	SA9Z-S12	
		ø1.0mm	SA9Z-S13	
		ø2.0mm	SA9Z-S14	

Connector Cables (for connector model sensors)

Item	Number of Core Wires	Type & Length	Part Number
	4	Straight, 2m	SA9Z-CM8K-4S2
		Straight, 5m	SA9Z-CM8K-4S5
		Right angle, 2m	SA9Z-CM8K-4L2
		Right angle, 5m	SA9Z-CM8K-4L5

Air Blower Mounting Blocks

Appearance	Item	Part Number
	Air blower mounting block	SA9Z-A02

Sensitivity Control Screwdriver

Item	Part No.	Package Quantity
Sensitivity Control Screwdriver 	SA9Z-AD01	1

Technical Specifications

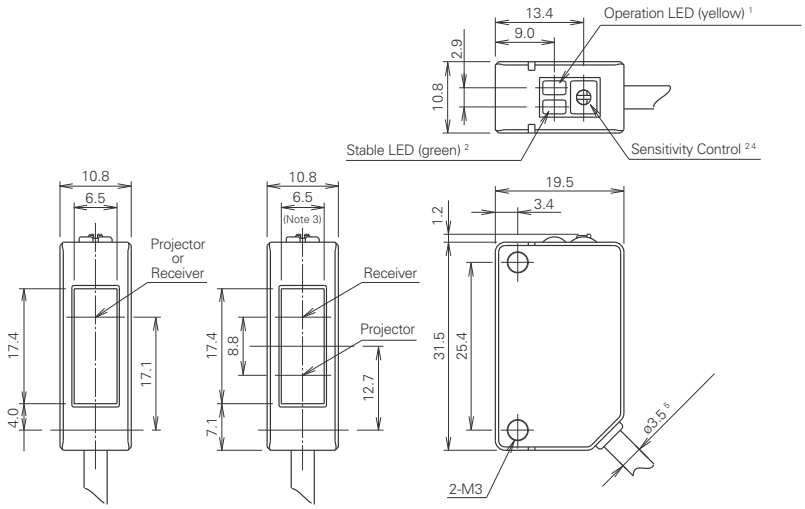
Sensing Method		Through-beam	Polarized Retro-reflective	Diffuse-reflective	Small-beam Reflective	Background Suppression (BGS)	Convergent Reflective	Transparent
Part Number		SA1E-□T	SA1E-□P	SA1E-D	SA1E-N	SA1E-□B	SA1E-G	SA1E-X
Power Voltage		12 to 24V DC (Operating range: 10 to 30V DC), Equipped with reverse-polarity protection						
Current Draw		Projector: 15mA Receiver: 20mA Laser Receiver: 30mA	30 mA with laser: 35mA					20mA maximum
Sensing Range		With sensitivity adjustment: 10m Laser models: 30m	w/ sensitivity adjustment: 2.5m (IAC-R5/R8) 1.5m (IAC-R6) 1.3m (IAC-RS2) 1.0m (IAC-RS1) 0.8m (IAC-R7□) [1] Laser models 0.3-10m	700mm (using 200 × 200mm white mat paper)	50 to 150mm (using 100 × 100mm white mat paper)	20mm to preset (using 200 × 200mm white mat paper) with laser: 20-300mm	5 to 35mm (using 100 × 100mm white mat paper)	2m (when using IAC-R9)
		Without sensitivity adjustment: 15m	w/o sensitivity adjustment: 3.0m (IAC-R5/R8) 2.0m (IAC-R6) 1.4m (IAC-RS2) 1.1m (IAC-RS1) 1.0m (IAC-R7□) [1]					
Adjustable Sensing Range		—				40 to 200mm with laser: 40-300mm	—	—
Detectable Object		Opaque		Opaque/Transparent		Opaque	Opaque/ Transparent	Opaque, transparent and mirror-like objects
Hysteresis		—		20% maximum		10% maximum	20% maximum	—
Response Time		1ms maximum, with laser: 250us						500µs maximum
Sensitivity Adjustment		Adjustable using a potentiometer (approx. 260°) Through-beam type and polarized retroreflective type are also available w/o sensitivity adjustment. Laser models: 2 turn adjustment				—	Adjustable using a potentiometer (approx. 260°)	Adjustable using a potentiometer (approx. 240°)
Sensing Range Adjustment		—				6-turn control knob	—	—
Light Source Element		Infrared LED, Red LED, Red laser diode	Red LED Red laser diode	Infrared LED	Red LED	Red LED Red laser diode	Infrared LED	Red LED
Operation Mode		Light ON/Dark ON						
Control Output		NPN open collector or PNP open collector, 30V DC, 100 mA maximum Voltage drop: 1.2V maximum (BGS type: 2V maximum), Short-circuit protection						
LED Indicators		Operation LED: Yellow Stable LED: Green, Power LED: Green (Through-beam type projector)				Operation LED: Yellow Stable LED: None	Operation LED: Yellow Stable LED: Green	Operation LED: Yellow Stable LED: None
Interference Prevention		—	Two units can be mounted in close proximity.					
Degree of Protection		IP67 (IEC 60529)						
Extraneous Light Immunity		Sunlight: 10,000 lux maximum, Incandescent lamp: 5,000 lux maximum (at receiver)						
Operating Temperature		–25 to +55°C (no freezing)						
Operating Humidity		35 to 85% RH (no condensation)						
Storage Temperature		–40 to +70°C (no freezing)						
Insulation Resistance		Between live part and mounting bracket: 20 MΩ maximum (500V DC megger)						
Dielectric Strength		Between live part and mounting bracket: 1000V AC, 50/60Hz, 1 minute						
Vibration Resistance		Damage limits: 10 to 55Hz, Amplitude 0.75mm, 20 cycles in each of 3 axes						
Shock Resistance		Damage limits: 500m/s^2, 10 shocks in each of 3 axes						
Material		Housing: PC/PBT, Lens: PC (Polarized retroreflective / coaxial polarized retro-reflective: PMMA), Indicator cover: PC						
Attachments		Instruction sheet						
Weight (approx.)	Cabel Model	Projector: 30g Laser Projector: 35g Receiver: 30g [2] Laser Receiver: 35g	30g [2] with laser: 35g			35g [3]	30g [2]	35g [3]
	Connector Model	Projector: 10g Laser Projector: 20g Receiver: 10g Laser Receiver: 20g	10g with Laser 20g			20g	10g	20g
Connection Method	Cable Model	ø3.5mm, 3-core, 0.2mm^2, 1-m vinyl cabtyre cable (2-core for the projector of through-beam type)						
	Connector Model	M8 connector (4-pin)						

1. Maintain at least the distance shown below between the SA1E photoelectric switch and reflector. IAC-R5/R6/R7□/R8: 100 mm, IAC-RS1/RS2: 150mm
   The detection distance cannot be guaranteed if the reflector is deformed or the tape type reflector is applied on uneven surface.
2. Cable length: 1m (50g when the cable length is 2m, 55g for laser models. 110g when the cable length is 5m, 120g for laser models.)
3. Cable length: 1m (55g when the cable length is 2m. 120g when the cable length is 5m.)
4. For laser models insert L in place of □.

Dimensions

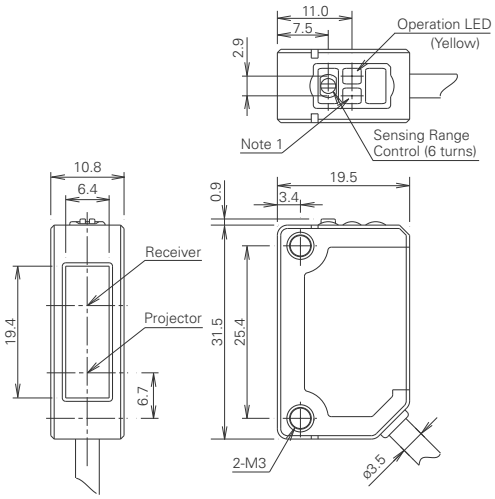
Cable Models

Through-beam, Polarized Retro-reflective, Convergent, Diffuse-reflective, Small-beam reflective

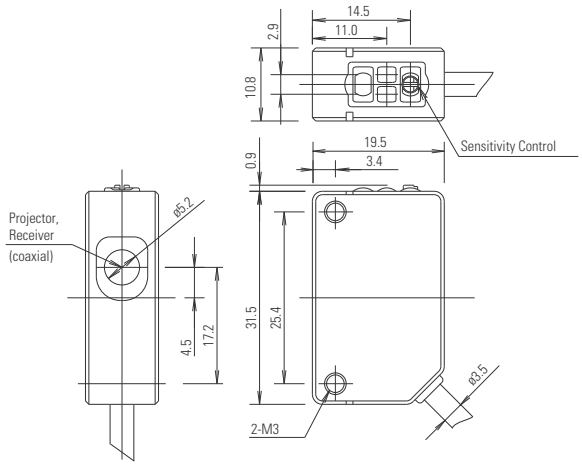


1. Power ON LED (green) for through-beam projector.
2. No sensitivity control and stable LED are attached on the through-beam projector.
3. 5.2 mm for polarized retroreflective model.
4. No sensitivity control is installed on the mdoels without sensitivity adjustment.

Background Suppression (BGS)

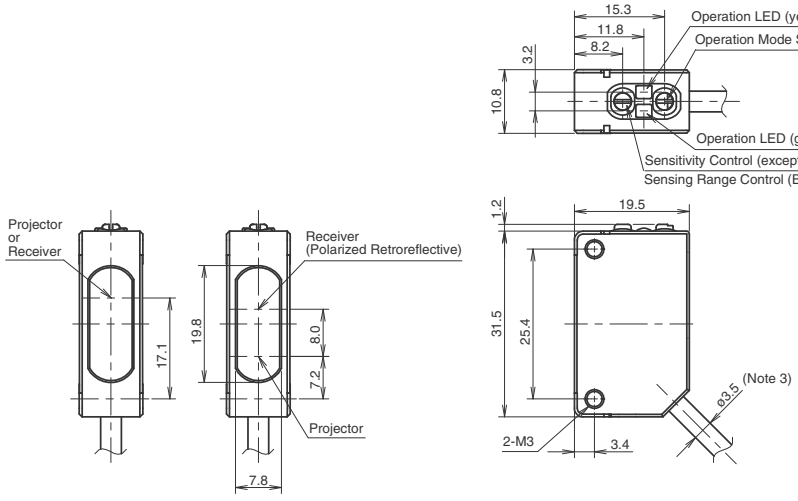


Transparent



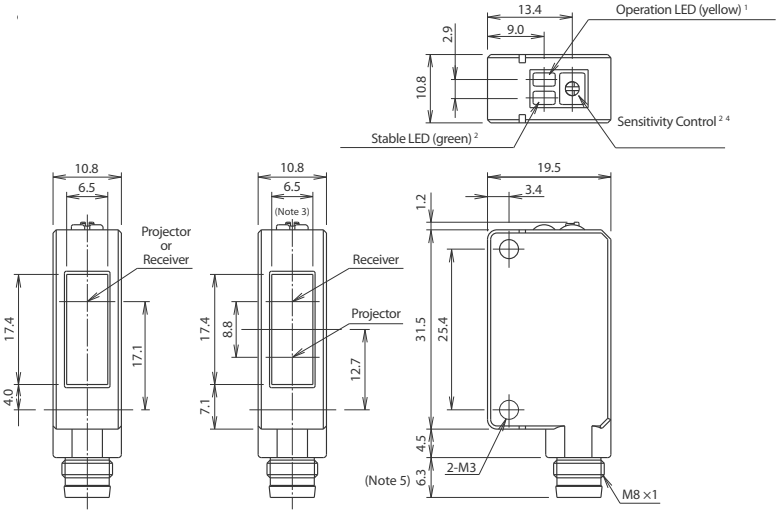
Stable LED is not provided on the background suppression or coaxial polarized retro-reflective models.

Laser (Through-beam, Polarized Retro-reflective, Background Suppression)



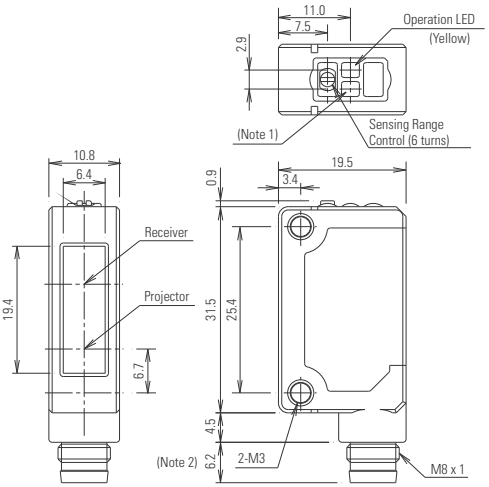
Connector Models

Through-beam, Polarized Retro-reflective, Convergent, Diffuse-reflective, Small-beam reflective

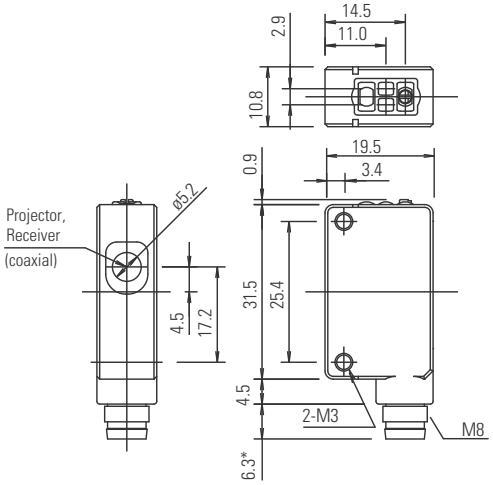


1. Power ON LED (green) for through-beam projector.
2. No sensitivity control and stable LED are attached on the through-beam projector.
3. 5.2 mm for polarized retroreflective model.
4. No sensitivity control is installed on the mdoels without sensitivity adjustment.

Background Suppression (BGS)

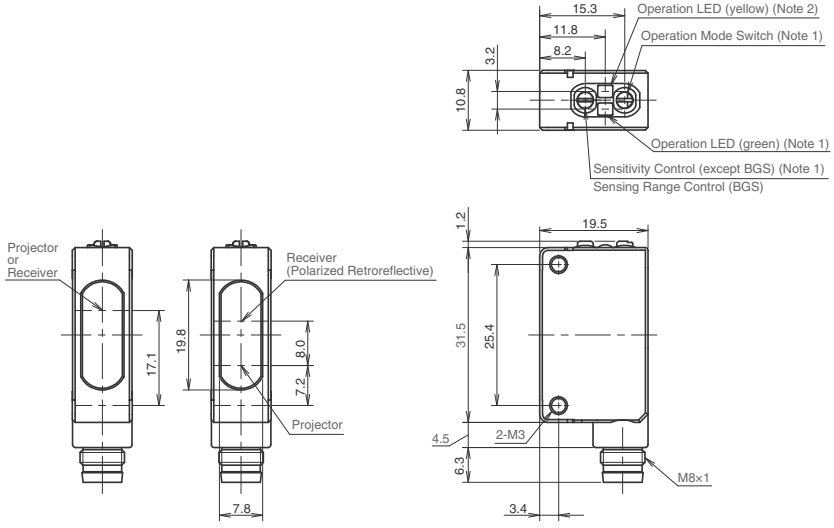


Transparent



1. Stable LED is not provided on the background suppression or coaxial polarized retro-reflective models.
2. The connector length is 18mm when a right-angle connector cable is used.

Laser (Through-beam, Polarized Retro-reflective, Background Suppression)



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