IDEC

Miniature Photoelectric Sensors
(Built-in Amplifier)/Laser Model

SA2E/SA1E/SA1E-L

Miniature High-Performance Photoelectric Sensors

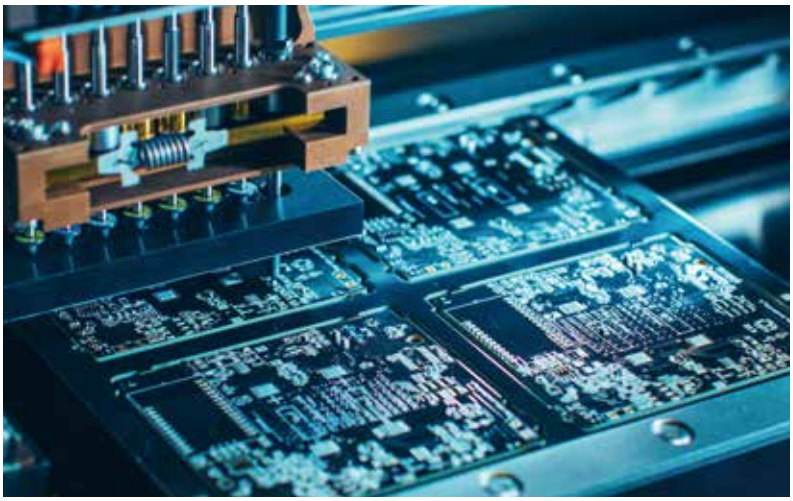
Enhanced detection accuracy and response time

IDEC CORPORATION

Choose according to sensing methods, sensing dis

Through-beam

Background Suppression



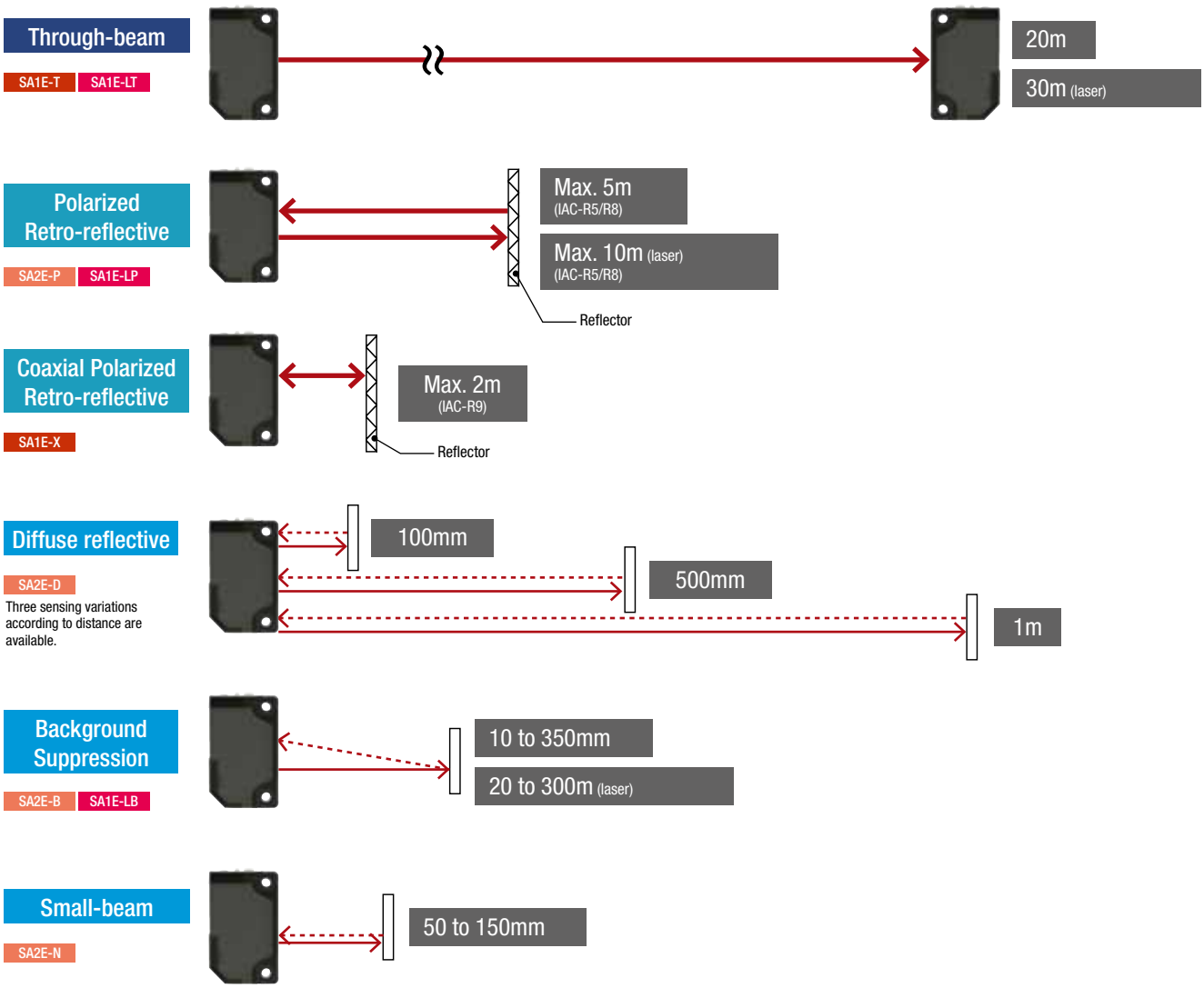
Sensing Method	Through-beam		Retro-reflective		
			Polarized Retro-reflective		Coaxial Polarized Retro-reflective (Transparent object sensing)
Part No.	SA1E-T	SA1E-LT	SA2E-P	SA1E-LP	SA1E-X
Sensing Range	20m	30m	5m (Depends on the reflector)	10m	2m (Depends on the reflector)
Light Source Element	Infrared LED	Red laser	Red LED	Red laser	Red LED
Detectable Object	Opaque	ø6mm (opaque, at 3m)	Opaque	ø6mm opaque (opaque, at 3 m)	Opaque/Mirror/ Transparent
Response Time	1ms	0.25ms	**0.5**ms	0.25ms	**0.5**ms
Sensitivity Adjustment/ Sensing Range Adjustment (BGS only)	Adjustable using a potentiometer (approx. 240°)				
Operation Mode	Light ON/Dark ON (select by model)	Light ON/Dark ON (selectable) (select using the Operation Mode Switch)			Light ON/Dark ON (select by model)
Control Output	NPN open collector or PNP open collector				
Current Draw (Power Voltage 12 to 24V DC)	Projector: 15mA maximum Receiver: 20mA maximum	Projector: 15mA maximum Receiver: 30mA maximum	20mA maximum	35mA maximum	20mA maximum
Degree of Protection	IP67				
Operating Temperature (no freezing)	–25 to +55°C	–10 to +55°C	**–30** to **+55**°C	–10 to +55°C	–25 to +55°C
Dimensions	W10.8 × D19.5 × H31.5 (excluding LEDs and controls)				

Diffuse-reflective

Small-beam Reflective

Reflective					
Background Suppression (BGS)		Diffuse-reflective			Small-beam Reflective
SA2E-B	SA1E-LB	SA2E-D			SA2E-N
10 to 350mm Adjustable sensing range 20 to 350mm	20 to 300mm Adjustable sensing range 40 to 300mm	100mm	500mm	1m	50 to 150mm
Red LED	Red laser	Infrared LED	Red LED	Infrared LED	Red LED
Opaque	ø0.2mm (copper wire, at 170mm)	Opaque/Transparent			Opaque/Transparent
0.5ms	0.25ms	**0.5**ms			**0.5**ms
6-turn control knob		Adjustable using a potentiometer (approx. 240°)			
Light ON/Dark ON (selectable) (select using the Operation Mode Switch)					
NPN open collector or PNP open collector					
20mA maximum	35mA maximum	20mA maximum			20mA maximum
IP67					
–30 to **+55**°C	–10 to +55°C	**–30** to **+55**°C			**–30** to **+55**°C
W10.8 × D19.5 × H31.5 (excluding LEDs and controls)					

Sensing range variations



0.5ms response time, high-speed detection

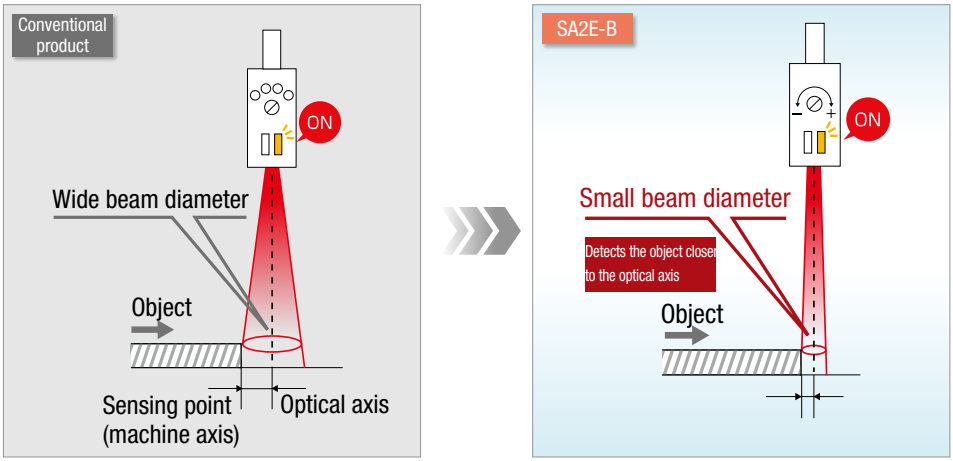
SA2E

Small objects moving at high speed were detected at intervals, but with SA2E, the response time is 0.5ms, allowing continuous detection of small objects at high speed.

Beam diameter enables accurate detection of various objects (BGS)

SA2E-B Background Suppression (BGS)

By reducing the light beam diameter by 30 to 40% compared to conventional photoelectric sensors, the accuracy of the detecting position is improved.

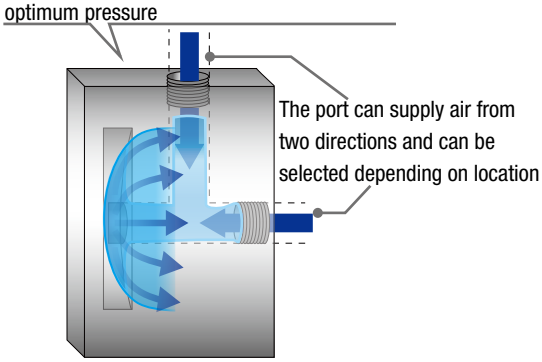


Air blower unit allows stable detection in dusty environment

SA2E SA1E SA1E-L

IDEC's unique air blower unit mounting bracket is available as an option. Maintains detection performance of the sensor and keeps the detection surface clean.

Designed to blow air over the entire lens at the optimum pressure



Operational at a temperature of -30 to 55°C

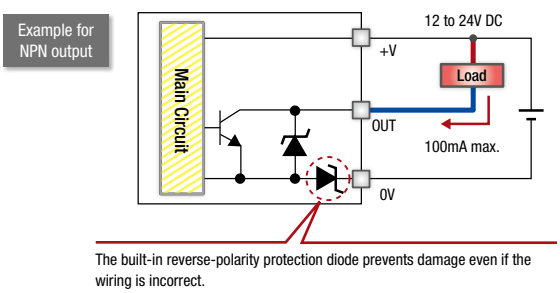
SA2E

Features operating temperature range of -30 to +55°C.
Ideal for installation on equipment used in cold storage warehouses.

Output reverse-polarity protection circuit

SA2E SA1E

In addition to reverse-polarity protection for the power voltage, an output reverse-polarity protection circuit is also built-in, to protect the sensor from damage in the event of incorrect wiring.

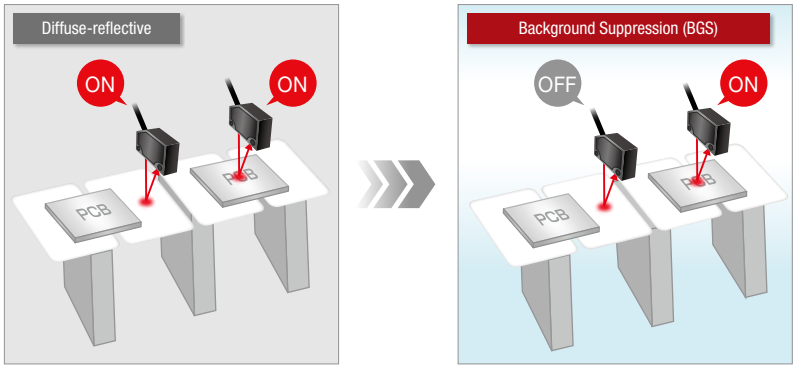


Sensors available to suit a variety of workpieces

Background Suppression (BGS)

SA2E-B Background Suppression (BGS)

Ignores background and reliably detects workpieces. Not easily affected by the color of the workpiece and edges can be accurately detected by narrow beams. Detailed setting of distances is possible.

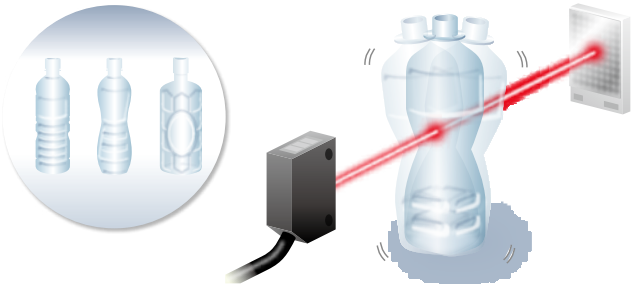


Coaxial Polarized Retro-reflective (Transparent object sensing)

SA1E-X Coaxial Polarized Retro-reflective Transparent Object Sensing)

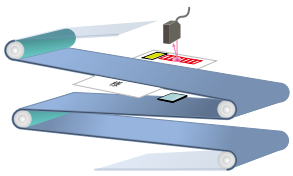
Detects transparent objects of various shapes

Coaxial optical structure and narrow beam ensure stable detection; unaffected by narrowing, inclination or shaking of transparent objects.

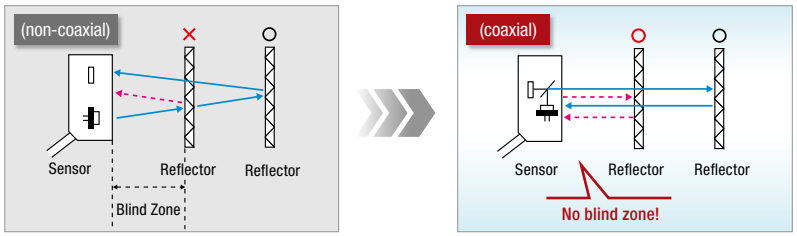


Application examples of transparent object sensing

Because of its coaxial structure, SA1E-X does not have a blind zone, such as shown below. Other than detecting transparent objects, because the workpiece can be detected closely to the sensor, SA1E-X can be used in applications in narrow installation locations and where objects are near the sensor.



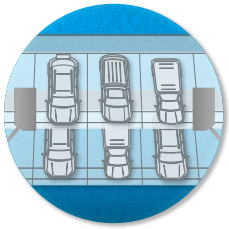
Mail sorting machine



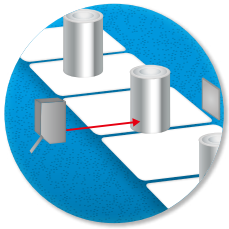
Application examples

SA2E SA1E

Through-beam
Automated parking garage

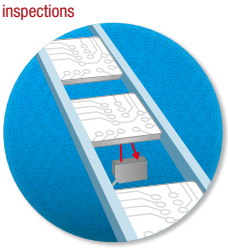


Polarized Retro-reflective
Detection of mirror surfaces

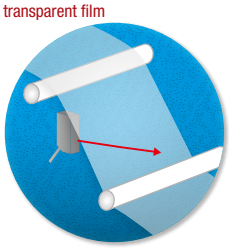


Diffuse-reflective
Restroom sink

Background Suppression (BGS)
Detecting PC board at inspections



Coaxial Polarized Retro-reflective (Transparent Object Sensing)
Detecting the end of a transparent film

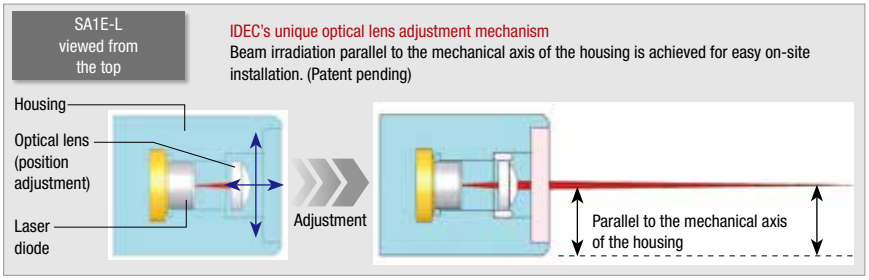


Laser models ensure fast response and accurate sensing

SA1E-L

Easy-to-align optical axis

IDEC's unique optical lens adjust function achieves easy and speedy optical adjustment when installing machines and equipment. Simple and accurate set up of long distance and small workpiece reading.

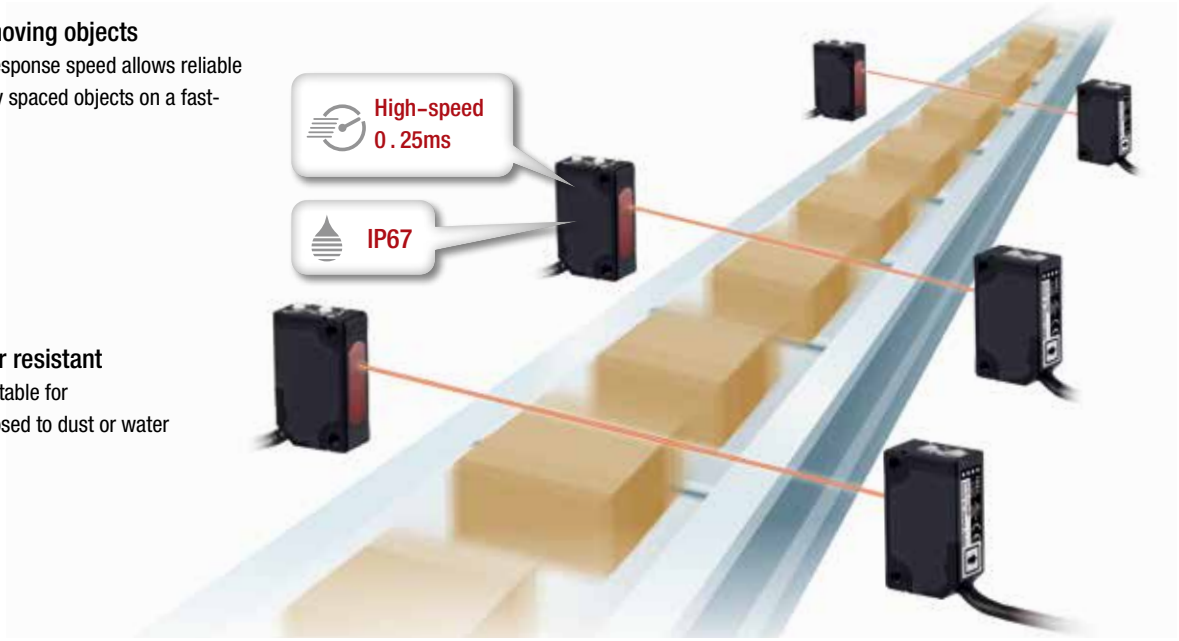


Detects fast-moving objects

The fast 0.25ms response speed allows reliable detection of closely spaced objects on a fast-moving conveyor.

Dust and water resistant

IP67 protection suitable for environments exposed to dust or water vapor.



Easy positioning

Because the visible red laser is easily seen in both short (20mm) and long (30m) distances, the detecting position and optical axis can be seen at a glance. The small beam can detect small objects, and also enables easy positioning of the sensor in applications where the beam passes through narrow spaces. All models are Class 1 laser compliant (JIS, IEC, FDA).

Application examples

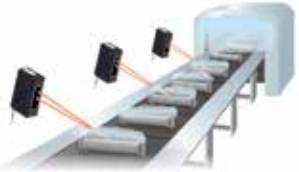
SA1E-L

Detection from narrow locations

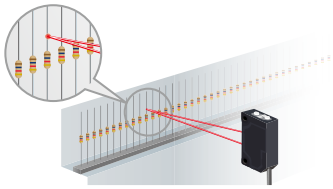
Detection of narrow gaps between objects on high-speed lines

Long distance detection

Detection in dust or water vapor



Detection of small objects



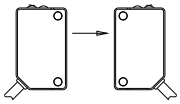
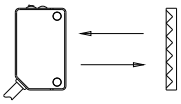
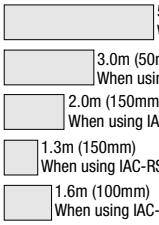
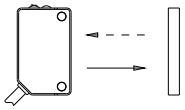
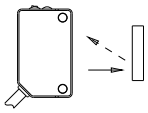
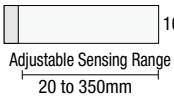
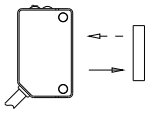
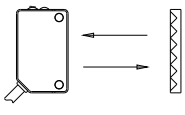
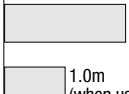
Miniature Photoelectric Sensors (Built-in Amplifier)/Laser Model

See website for details on approvals and standards.

SA2E/SA1E

Part No.

Package Quantity: 1

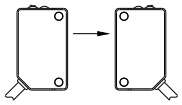
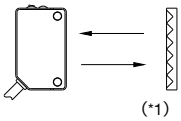
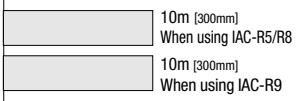
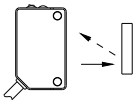
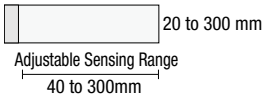
Sensing Method				Sensing Range	Connection	Cable Length (m)	Operation Mode	Part No.	
								NPN Output	PNP Output
Through-beam	Infrared LED	With Sensitivity Adjustment		 20m * See the characteristics on P18.	Cable	1	Light ON	SA1E-TN1	SA1E-TP1
							Dark ON	SA1E-TN2	SA1E-TP2
						2	Light ON	SA1E-TN1-2M	SA1E-TP1-2M
							Dark ON	SA1E-TN2-2M	SA1E-TP2-2M
						5	Light ON	SA1E-TN1-5M	SA1E-TP1-5M
							Dark ON	SA1E-TN2-5M	SA1E-TP2-5M
					Connector	—	Light ON	SA1E-TN1C	SA1E-TP1C
							Dark ON	SA1E-TN2C	SA1E-TP2C
Polarized Retro-reflective	Red LED	With Sensitivity Adjustment	 * Maintain at least the distance shown in the ( ) between the photoelectric switch and reflector. (*1)	 5.0m (50mm) When using IAC-R5/R8 3.0m (50mm) When using IAC-R6 2.0m (150mm) When using IAC-RS2 1.3m (150mm) When using IAC-RS1 1.6m (100mm) When using IAC-R7☐ * See the characteristics on P19.	Cable	2	Select Light ON/ Dark ON	SA2E-PN3-2M	SA2E-PP3-2M
					Connector	—		SA2E-PN3C	SA2E-PP3C
Diffuse-reflective	Infrared LED	With Sensitivity Adjustment		 1m * See the characteristics on P19.	Cable	2	Select Light ON/ Dark ON	SA2E-DN3L-2M	SA2E-DP3L-2M
					Connector	—		SA2E-DN3LC	SA2E-DP3LC
	Red LED			 500mm * See the characteristics on P19.	Cable	2		SA2E-DN3M-2M	SA2E-DP3M-2M
					Connector	—		SA2E-DN3MC	SA2E-DP3MC
	Infrared LED			 100mm * See the characteristics on P19.	Cable	2		SA2E-DN3S-2M	SA2E-DP3S-2M
					Connector	—		SA2E-DN3SC	SA2E-DP3SC
Background Suppression (BGS)	Red LED	With Sensing Range Adjustment		 10 to 350mm Adjustable Sensing Range 20 to 350mm * See the characteristics on P20.	Cable	2	Select Light ON/ Dark ON	SA2E-BN3-2M	SA2E-BP3-2M
					Connector	—		SA2E-BN3C	SA2E-BP3C
Small-beam Reflective	Red LED	With Sensitivity Adjustment		 50 to 150mm * See the characteristics on P19.	Cable	2	Select Light ON/ Dark ON	SA2E-NN3-2M	SA2E-NP3-2M
					Connector	—		SA2E-NN3C	SA2E-NP3C
Coaxial Polarized Retro-reflective (Transparent Object Sensing)	Red LED	With Sensitivity Adjustment	 (*1)	 2.0m (when using IAC-R9) 1.0m (when using IAC-R10) 1.0m (when using IAC-R11) * See the characteristics on P20.	Cable	1	Light ON	SA1E-XN1	SA1E-XP1
							Dark ON	SA1E-XN2	SA1E-XP2
						2	Light ON	SA1E-XN1-2M	SA1E-XP1-2M
							Dark ON	SA1E-XN2-2M	SA1E-XP2-2M
						5	Light ON	SA1E-XN1-5M	SA1E-XP1-5M
							Dark ON	SA1E-XN2-5M	SA1E-XP2-5M
					Connector	—	Light ON	SA1E-XN1C	SA1E-XP1C
							Dark ON	SA1E-XN2C	SA1E-XP2C

*1: Reflectors are not supplied and must be ordered separately.

SA1E–L

Part No.

Package Quantity: 1

Sensing Method				Sensing Range	Connection	Cable Length (m)	Part No.	
							NPN Output	PNP Output
Through-beam	Red laser	w/Sensitivity Adjustment		 * See the characteristics on P21.	Cable	1	SA1E-LTN3	SA1E-LTP3
						2	SA1E-LTN3-2M	SA1E-LTP3-2M
						5	SA1E-LTN3-5M	SA1E-LTP3-5M
					Connector	—	SA1E-LTN3C	SA1E-LTP3C
Polarized Retro-reflective	Red laser	w/Sensitivity Adjustment		 * See the characteristics on P21.	Cable	1	SA1E-LPN3	SA1E-LPP3
						2	SA1E-LPN3-2M	SA1E-LPP3-2M
						5	SA1E-LPN3-5M	SA1E-LPP3-5M
					Connector	—	SA1E-LPN3C	SA1E-LPP3C
Background Suppression (BGS)	Red laser	w/Sensing Range Adjustment		 * See the characteristics on P22.	Cable	1	SA1E-LBN3	SA1E-LBP3
						2	SA1E-LBN3-2M	SA1E-LBP3-2M
						5	SA1E-LBN3-5M	SA1E-LBP3-5M
					Connector	—	SA1E-LBN3C	SA1E-LBP3C

*1:Maintain at least the distance shown in [ ] between the photoelectric switch and reflector. Reflectors are not supplied and must be ordered separately.

SA2E/SA1E

Specifications

		Through-beam	Polarized Retro-reflective
Part No.		SA1E-T☐	SA2E-P☐
Power Voltage		12 to 24V DC (Operating range: 10 to 30V DC) equipped with reverse-polarity protection	
Current Draw		Projector: 15mA maximum Receiver: 20mA maximum	20mA maximum
Sensing Range		20m	5.0 m (IAC-R5/R8) 3.0 m (IAC-R6) 2.0 m (IAC-RS2) 1.3 m (IAC-RS1) 1.6 m (IAC-R7☐) (*1)
Adjustable Sensing Range		—	
Detectable Object		Opaque	
Hysteresis		—	20% maximum
Response Time		1ms maximum	0.5 ms maximum
Sensitivity Adjustment		Adjustable using a potentiometer (approx. 240°)	
Sensing Range Adjustment		—	
Light Source Element		Infrared LED	Red LED
Operation Mode		Light ON/Dark ON (select by part No.)	Light ON/Dark ON (selectable) (select with the Operation Mode Switch)
Control Output		NPN open collector or PNP open collector (30V DC, 100 mA maximum with short circuit protection circuit)	
		Voltage drop: 2V max. (30V DC, 100mA) 1.2V max. (30V DC, 10mA) Output Reverse-polarity Protection Circuit	
LED Indicators		Operation LED: Amber Stable LED: Green, Power LED: Green (Through-beam type projector)	
Interference Prevention		—	Two units can be mounted in close proximity.
Degree of Protection		IP67 (IEC60529)	
Extraneous Light Immunity		Sunlight: 10,000 lux maximum, Incandescent lamp: 5,000 lux maximum (at receiver)	Sunlight: 40,000 lux maximum, Incandescent lamp: 10,000 lux maximum (at receiver)
Operating Temperature		-25 to +55°C (no freezing)	-30 to +55°C (no freezing)
Operating Humidity		35 to 95% RH (no condensation)	
Storage Temperature		-40 to +70°C (no freezing)	
Insulation Resistance		Between live part and mounting bracket: 20 MΩ minimum (500V DC megger)	
Dielectric Strength		1,000V AC, 50/60 Hz, 1 minute (between live part and mounting bracket)	
Vibration Resistance		10 to 55 Hz, amplitude 1.5mm 55 to 500 Hz, acceleration 90m/s^2 1 cycle 5 mins 30 mins in each of 3 axes	
Shock Resistance		1000m/s^2 3 shocks in 6 directions on 3 axes	
Material	Case	PBT	
	Lens	PMMA	
	Indicator Model	PC	
Weight (approx.)	Cable Model	Projector: 50g, Receiver: 50g (*2)	50g
	Connector Model	Projector: 10g, Receiver: 10g	20g
Connection Method	Cable Model	ø3.5mm, 3-core (2-core for through-beam), 0.2mm^2, vinyl cabtyre cable	
	Connector Model	M8 connector (4-pin)	

*1: Maintain at least the distance shown below between the photoelectric switch and reflector.
IAC-R5/R6/R8: 50mm, **IAC-R7**: 100mm, **IAC-RS1/RS2**: 150mm
The detection distance cannot be guaranteed if the reflector is deformed or the reflector tape is applied on an uneven surface.
*2: Cable length: 2m (30g when the cable length is 1m. 110g when the cable length is 5m.)

SA2E/SA1E

Specifications

		Diffuse-reflective			Background Suppression (BGS)	Small-beam Reflective	Coaxial Polarized Retro-reflective (Transparent Object Sensing)
		Short Distance	Medium Distance	Long Distance			
Part No.		SA2E-D□3S	SA2E-D□3M	SA2E-D□3L	SA2E-B□	SA2E-N□	SA1E-X□
Power Voltage		12 to 24V DC (Operating range: 10 to 30V DC) equipped with reverse-polarity protection					
Current Draw		20mA maximum					
Sensing Range		100mm (using 200 × 200mm white paper)	500mm (using 200 × 200mm white paper)	1m (using 200 × 200mm white paper)	10 to 350mm (using 200 × 200mm white paper)	50 to 150mm (using 100 × 100mm white paper)	2m (using IAC-R9)
Adjustable Sensing Range		—			20 to 350mm (using 200 × 200mm white paper)	—	
Detectable Object		Opaque/transparent			Opaque	Opaque/transparent	Opaque/transparent/mirror
Hysteresis		20% maximum			5% maximum	20% maximum	—
Response Time		0.5ms maximum					
Sensitivity Adjustment		Adjustable using a potentiometer (approx. 240°)			—	Adjustable using a potentiometer (approx. 240°)	
Sensing Range Adjustment		—			6-turn control knob	—	
Light Source Element		Infrared LED	Red LED	Infrared LED	Red LED		
Operation Mode		Light ON/Dark ON (selectable) (select with the Operation Mode Switch)					Light ON/Dark ON (select by Part No.)
Control Output		NPN open collector or PNP open collector (30V DC, 100mA maximum with short circuit protection circuit)					
		Voltage drop: 2V max. (30V DC, 100mA) 1.2V max. (30V DC, 10mA) Output Reverse-polarity Protection Circuit					Voltage drop: 2V max. (30V DC, 100mA)
LED Indicators		Operation LED: Amber Stable LED: Green					Operation LED: Yellow
Interference Prevention		Two units can be mounted in close proximity.					
Degree of Protection		IP67 (IEC60529)					
Extraneous Light Immunity		Sunlight: 40,000 lux maximum, Incandescent lamp: 10,000 lux maximum (at receiver)					Sunlight: 10,000 lux maximum, Incandescent lamp: 5,000 lux maximum (at receiver)
Operating Temperature		-30 to +55°C (no freezing)					-25 to +55°C (no freezing)
Operating Humidity		35 to 95% RH (no condensation)					
Storage Temperature		-40 to +70°C (no freezing)					
Insulation Resistance		Between live part and mounting bracket: 20 MΩ minimum (500V DC megger)					
Dielectric Strength		1,000V AC, 50/60 Hz, 1 minute (between live part and mounting bracket)					
Vibration Resistance		10 to 55 Hz, amplitude 1.5mm 55 to 500 Hz, acceleration 90m/s^2 1 cycle 5 mins 30 mins in each of 3 axes					10 to 55 Hz, amplitude 1.5mm 1 cycle 5 mins 30 mins in each of 3 axes
Shock Resistance		1000m/s^2 3 shocks in 6 directions on 3 axes					500m/s^2 3 shocks in 6 directions on 3 axes
Material	Case	PBT					PC/PBT
	Lens	PMMA					
	Indicator Model	PC					
Weight (approx.)	Cable Model	50g					55g (*1)
	Connector Model	20g					20g
Connection Method	Cable Model	ø3.5mm, 3-core, 0.2mm^2, vinyl cabtyre cable					
	Connector Model	M8 connector (4-pin)					

*1: Cable length: 2m (35g when the cable length is 1m. 120g when the cable length is 5m.)

SA1E–L

Specifications

		Through-beam	Polarized Retro-reflective	Background Suppression (BGS)
Part No.		SA1E-LT☐	SA1E-LP☐	SA1E-LB☐
Power Voltage		12 to 24V DC (Operating range: 10 to 30V DC) equipped with reverse-polarity protection		
Current Draw		Projector: 15mA maximum Receiver: 30mA maximum	35mA maximum	
Sensing Range		30m	0.3 to 10m (using IAC-R5/R8/R9)	20 to 300mm (using 100 × 100mm white paper)
Adjustable Sensing Range		—		40 to 300mm
Detectable Object Size (typical)		ø6mm minimum (opaque, at 3m)		ø0.2mm minimum (copper wire, at 170mm)
Detectable Object		Opaque		
Hysteresis		—		10% maximum
Response Time		0.25ms maximum		
Sensitivity Adjustment		Adjustable using a potentiometer		—
Sensing Range Adjustment		—		6-turn control knob
Light Source Element		Red laser diode (emission wavelength: 650nm) (IEC/JIS/FDA Class 1) (*1)		
Operation Mode		Light ON/Dark ON (selectable) (select with the Operation Mode Switch)		
Control Output		NPN open collector or PNP open collector (30V DC, 100mA maximum with short circuit protection circuit) Voltage drop: 1.5V max.		
LED Indicators		Operation LED: Yellow Stable LED: Green, Power LED: Green (Through-beam type projector only)		
Interference Prevention		—	Two units can be mounted in close proximity.	
Degree of Protection		IP67 (IEC60529)		
Extraneous Light Immunity		Sunlight: 10,000 lux maximum, Incandescent lamp: 5,000 lux maximum (at receiver)		
Operating Temperature		-10 to +55°C (no freezing)		
Operating Humidity		35 to 85% RH (no condensation)		
Storage Temperature		-25 to +70°C (no freezing)		
Storage Humidity		35 to 85% RH (no condensation)		
Insulation Resistance		Between live part and mounting bracket: 20 MΩ minimum (500V DC megger)		
Dielectric Strength		Cable models: 1,000V AC, 50/60 Hz, 1 minute (between live part and mounting bracket) Connector models when connected with connector cable: 500V AC, 50/60 Hz, 1 minute (between live part and clamp ring)		
Vibration Resistance		10 to 55 Hz, amplitude 1.5mm 1 cycle 5 mins 30 mins in each of 3 axes		
Shock Resistance		500m/s^2 3 shocks in 6 directions on 3 axes		
Material		Housing: PBT, Lens: PMMA, Indicator cover: PC, knob: POM		
Weight (approx.)	Cable Model	35g (*2)		
	Connector Model	20g		
Connection Method	Cable Model	ø3.5mm, 3-core, 0.2mm^2, vinyl cabtyre cable		
	Connector Model	M8 connector (4-pin)		

*1: Compliant with Class 1 of FDA regulations (21 CFR 1040.10 and 21 CFR 1040.11 according to Laser Notice No. 50).
*2: Cable length: 1m (55g when the cable length is 2m. 120g when the cable length is 5m.)

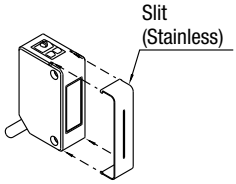
SA2E/SA1E/SA1E–L

Slit and Sensing Range (typical) [Through-beam SA1E-T☐]

Slit		With Sensitivity Adjustment			
		Sensing Range (m)		Minimum Detectable Object Width (mm) (*1)	
Part No.	Slit Width: A (See P26.)	Attached on: Receiver	Attached on: Receiver/Projector	Attached on: Receiver	Attached on: Receiver/Projector
SA9Z-S06	0.5mm	2.5	1.0	0.5	0.5
SA9Z-S07	1.0mm	3.5	1.5	1.0	1.0
SA9Z-S08	2.0mm	6.0	3.5	2.0	2.0
SA9Z-S09	0.5mm	2.0	0.7	0.5	0.5
SA9Z-S10	1.0mm	3.0	1.5	1.0	1.0
SA9Z-S11	2.0mm	5.5	3.0	2.0	2.0
SA9Z-S12	0.5mm	0.8	0.08	0.5	0.5
SA9Z-S13	1.0mm	1.5	0.3	1.0	1.0
SA9Z-S14	2.0mm	2.5	1.2	2.0	2.0

*1: At 1mm from receiver surface.

• The slit can be snapped onto the front easily. (See the figure below.)



Horizontal slits and round slits have an orientation.
Make sure that the TOP marking comes on top of the sensor (LED side).

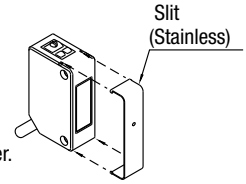
Slit and Sensing Range (typical) [Through-beam SA1E-LT☐]

Slit		Sensing Range (m)	Minimum Detectable Object Width (mm)
Part No.	Slit Width: A	Used on receiver	Used on receiver
SA9Z-S12	0.5mm	6	1.1
SA9Z-S13	1.0mm	10	1.6
SA9Z-S14	2.0mm	22	2.5

• When slit is mounted only on the receiver (when mounting on one side).

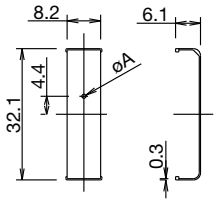
• Minimum detectable object width (mm): when the object is at the intermediate point between the projector and receiver.

The slit can be snapped onto the front easily.



Dimensions

All dimensions in mm



Material: Stainless Steel

The slits have an orientation. Make sure that the TOP marking comes on top of the sensor (LED side).

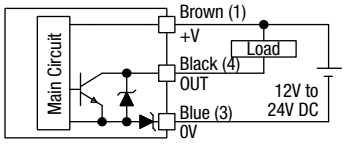
SA2E/SA1E/SA1E–L

Output Circuit & Wiring Diagram

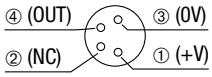
SA2E/SA1E

Through-beam, Polarized Retro-reflective, Diffuse-reflective, Background Suppression (BGS), Small-beam Reflective

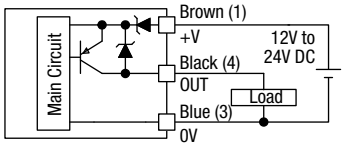
NPN Output



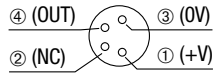
Connector Pin Assignment



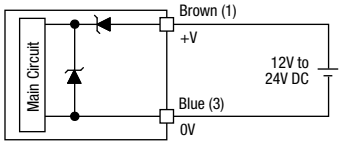
PNP Output



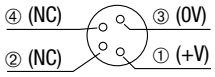
Connector Pin Assignment



Through-beam Projector

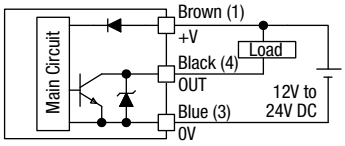


Connector Pin Assignment

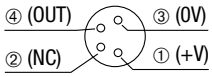


SA1E–X Coaxial Polarized Retro-reflective (Transparent Object Sensing)

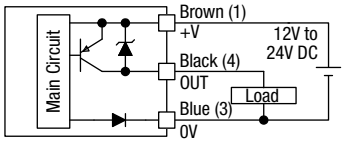
NPN Output



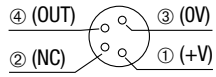
Connector Pin Assignment



PNP Output

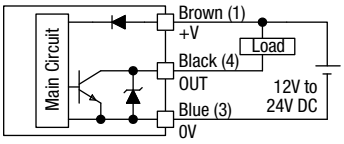


Connector Pin Assignment

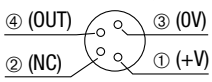


SA1E–L

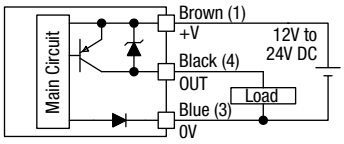
NPN Output



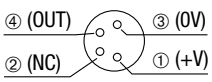
Connector Pin Assignment



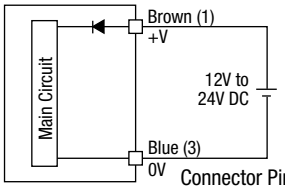
PNP Output



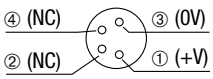
Connector Pin Assignment



Through-beam Projector



Connector Pin Assignment

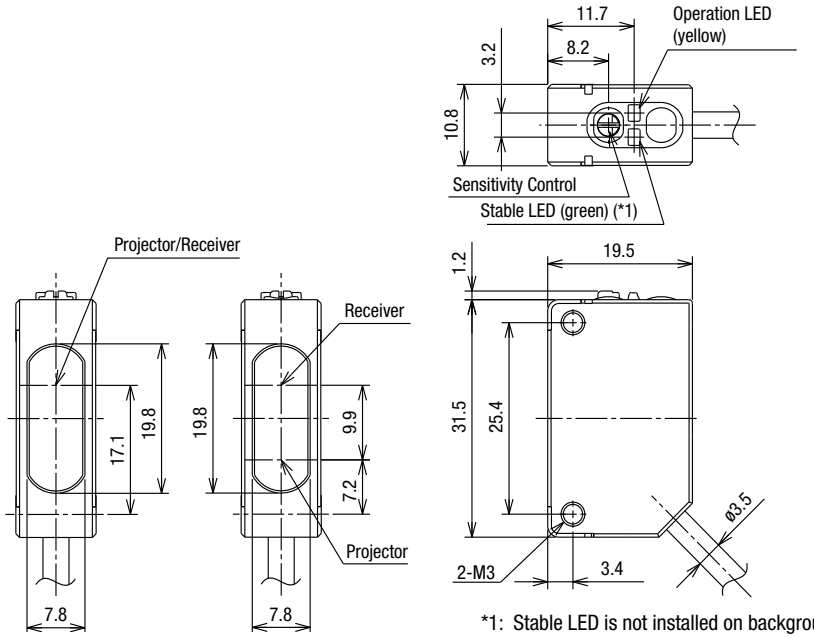


Dimensions (SA2E/SA1E)

All dimensions in mm.

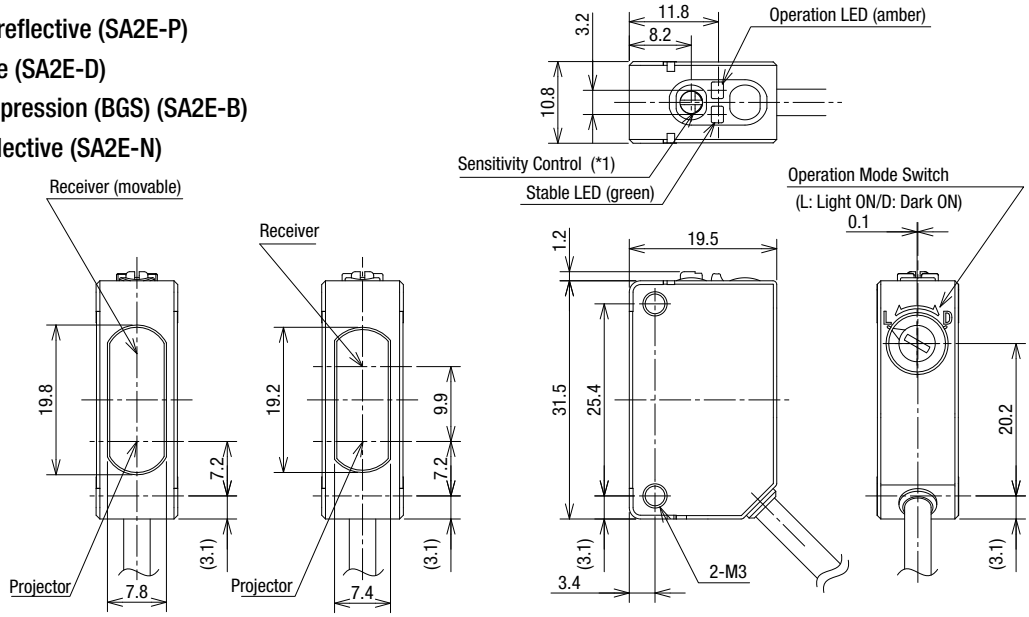
Cable Model

Through-beam (SA1E-T)



*1: Stable LED is not installed on background suppression (BGS) model.

Polarized Retro-reflective (SA2E-P)
Diffuse-reflective (SA2E-D)
Background Suppression (BGS) (SA2E-B)
Small-beam Reflective (SA2E-N)

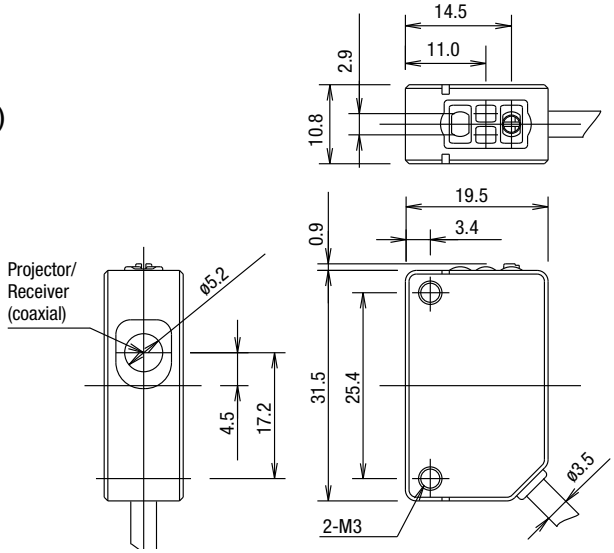


Background Suppression (BGS) (SA2E-B)

Polarized Retro-reflective (SA2E-P)
Diffuse-reflective (SA2E-D)
Small-beam Reflective (SA2E-N)

*1: SA2E-B has a knob for setting sensing range (6-turn control).

Coaxial Polarized Retro-reflective (Transparent Object Sensing) (SA1E-X)

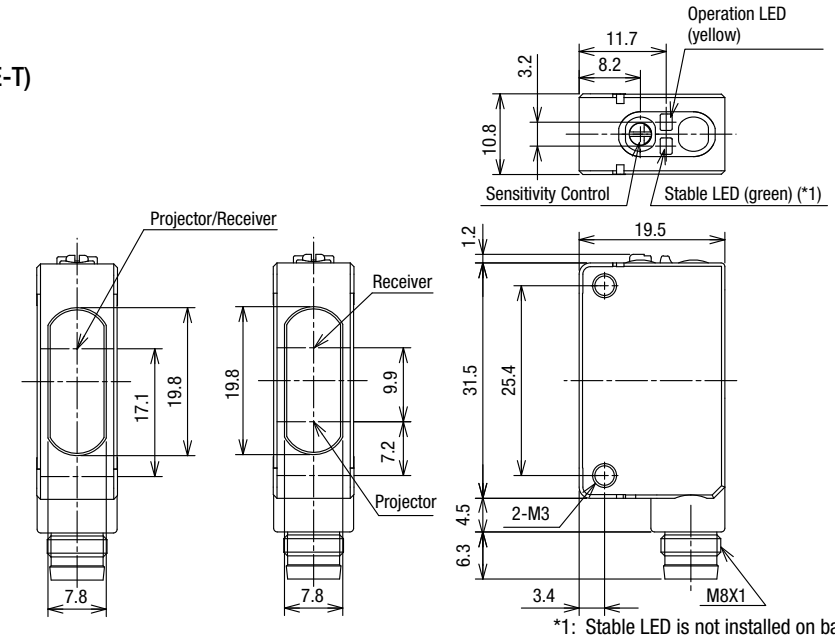


Dimensions (SA2E/SA1E)

All dimensions in mm.

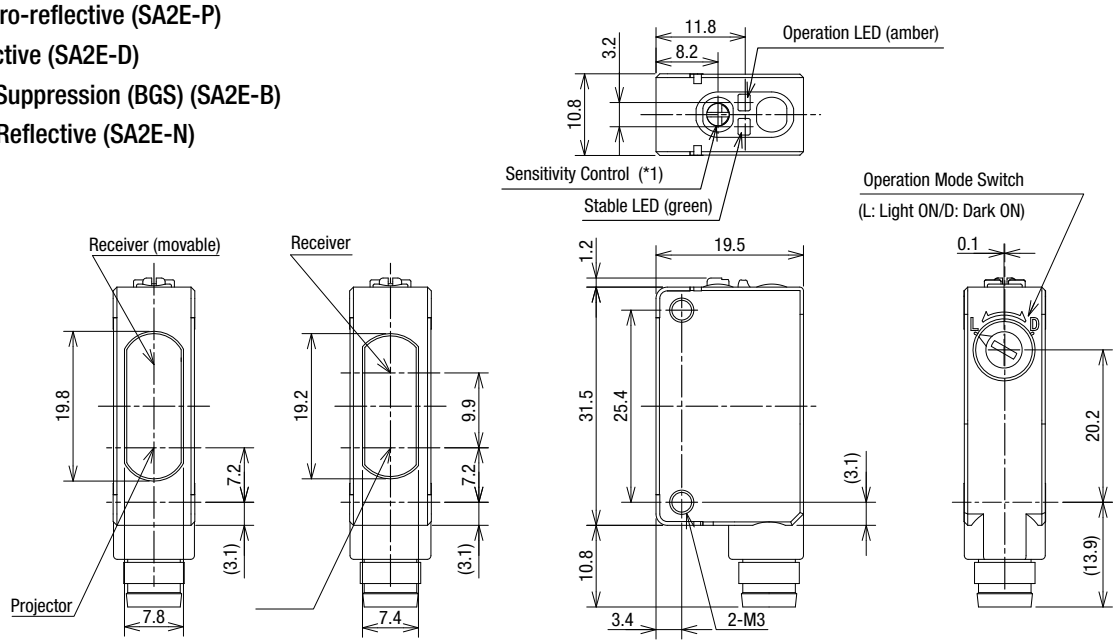
Connector Model

Through-beam (SA1E-T)



*1: Stable LED is not installed on background suppression (BGS) model.

Polarized Retro-reflective (SA2E-P)
Diffuse-reflective (SA2E-D)
Background Suppression (BGS) (SA2E-B)
Small-beam Reflective (SA2E-N)

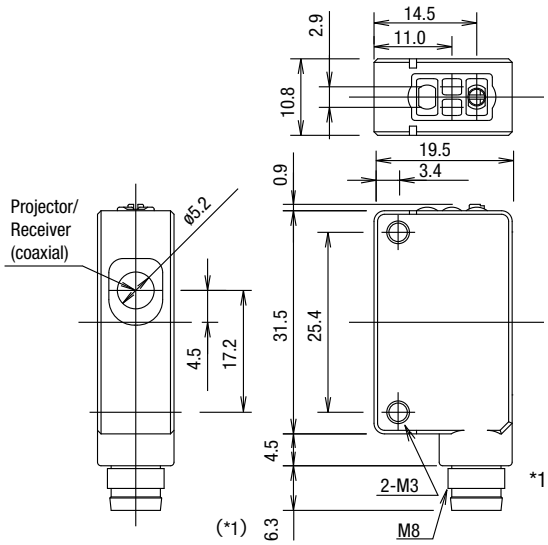


Background Suppression (BGS) (SA2E-B)

Polarized Retro-reflective (SA2E-P)
Diffuse-reflective (SA2E-D)
Small-beam Reflective (SA2E-N)

*1: SA2E-B has a knob for setting sensing range (6-turn control).

Coaxial Polarized Retro-reflective (Transparent Object Sensing) (SA1E-X)



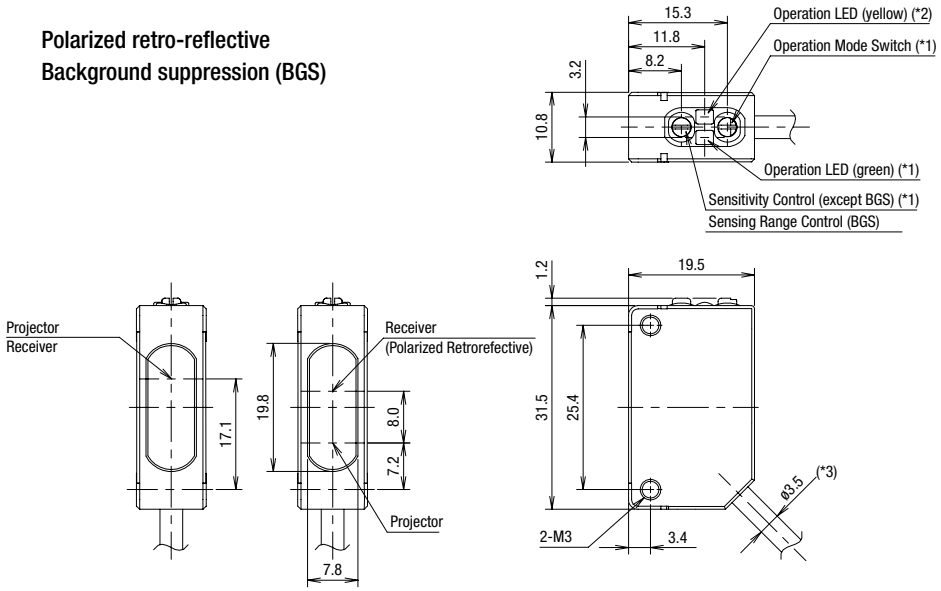
*1: The connector length is 18 mm when a right-angle connector cable (**SA9Z-CM8K-4L□**) is attached.

Dimensions (SA1E–L)

All dimensions in mm.

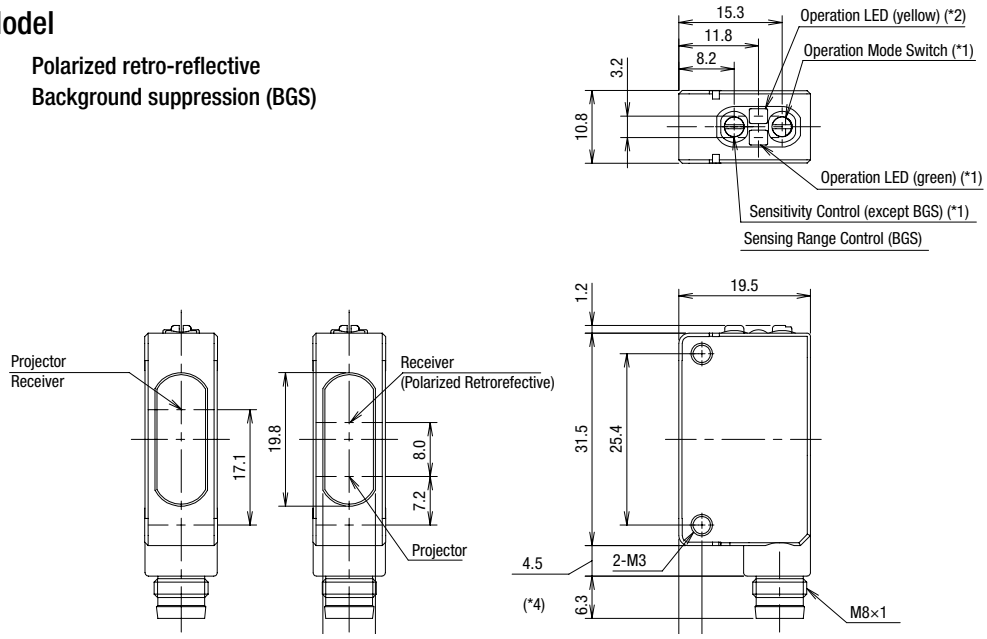
Cable Model

Through-beam Polarized retro-reflective
Background suppression (BGS)



Connector Model

Through-beam Polarized retro-reflective
Background suppression (BGS)

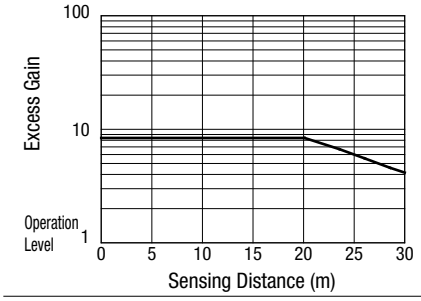


*1: No stable LED, sensitivity control, and operation mode switch are attached on the through-beam projector.
*2: Power LED (green) for through-beam projector.
*3: Cable length depends on models.
*4:The connector length is 18mm when a right-angle connector cable (SA9Z-CM8K-4L□) is attached.

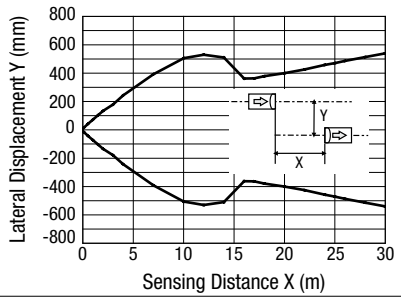
Characteristics (Typical) (SA2E/SA1E)

(1) Through-beam SA1E-T☐

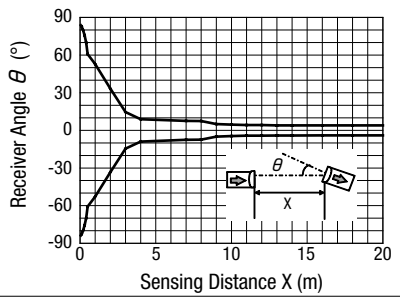
Excess Gain vs. Sensing Distance



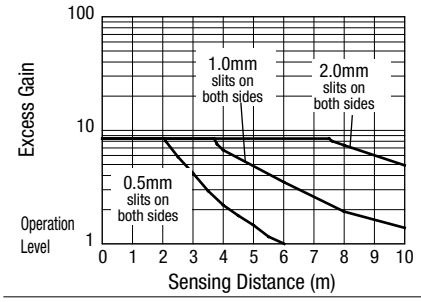
Lateral Displacement (Without slit)



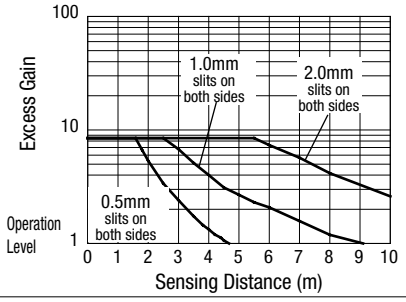
Angle (Without slit)



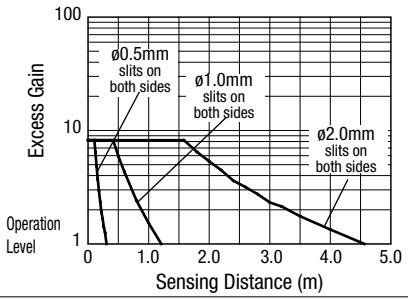
Excess Gain vs. Sensing Distance (With vertical slit)



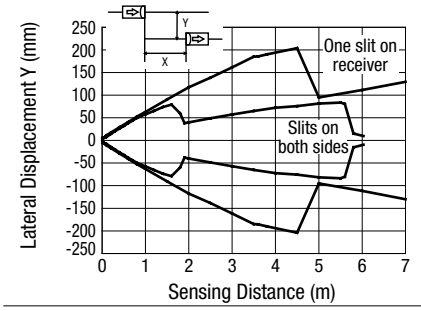
Excess Gain vs. Sensing Distance (With horizontal slit)



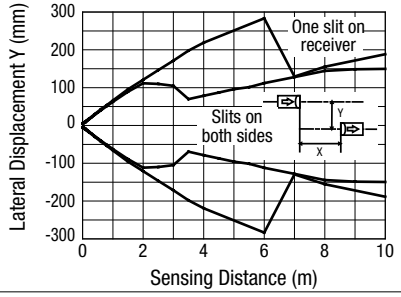
Excess Gain vs. Sensing Distance (With round slit)



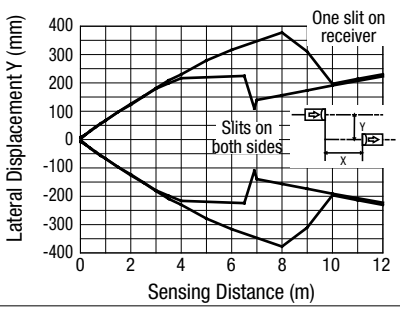
Lateral Displacement (With 0.5-mm vertical slit)



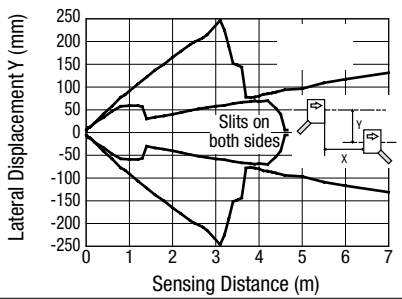
Lateral Displacement (With 1.0-mm vertical slit)



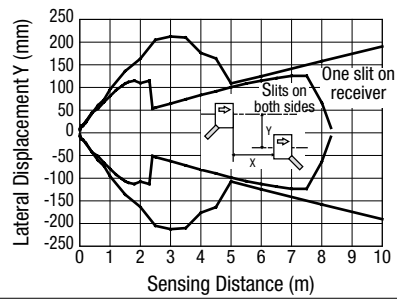
Lateral Displacement (With 2.0-mm vertical slit)



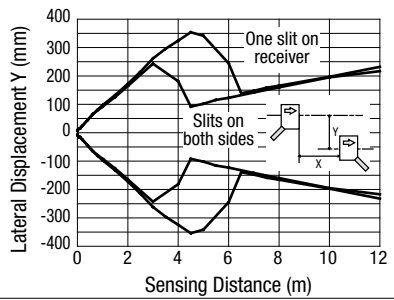
Lateral Displacement (With 0.5-mm horizontal slit)



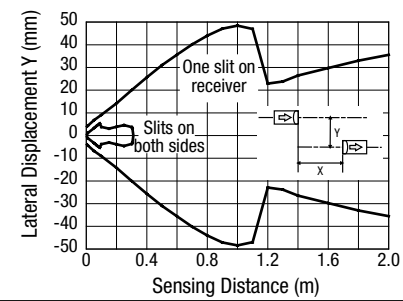
Lateral Displacement (With 1.0-mm horizontal slit)



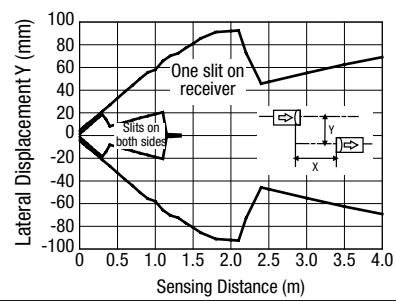
Lateral Displacement (With 2.0-mm horizontal slit)



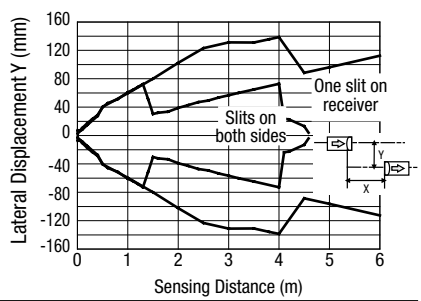
Lateral Displacement (With ø0.5-mm round slit)



Lateral Displacement (With ø1.0-mm round slit)



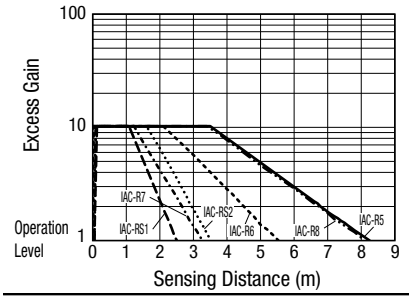
Lateral Displacement (With ø2.0-mm round slit)



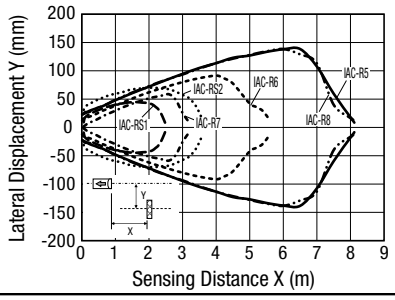
Characteristics (Typical) (SA2E/SA1E)

(2) Polarized Retro-reflective SA2E-P☐

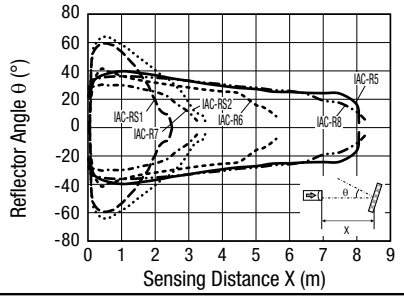
Excess Gain vs. Sensing Distance



Operating Area

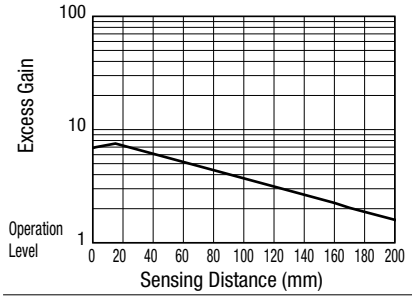


Angle

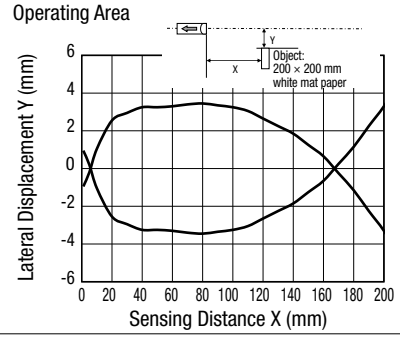


(3) Diffuse-reflective SA2E-DS☐ (100mm)

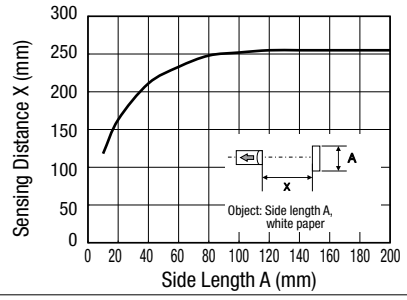
Excess Gain vs. Sensing Distance



Operating Area

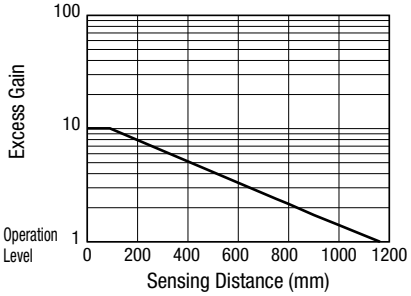


Sensing Distance vs. Object Size

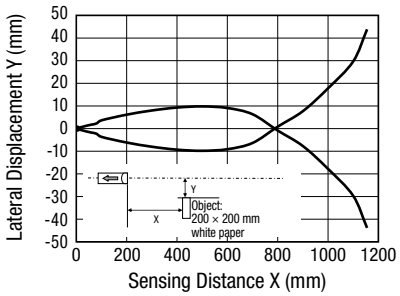


(4) Diffuse-reflective SA2E-DM☐ (500mm)

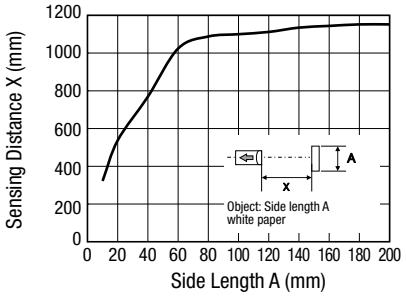
Excess Gain vs. Sensing Distance



Operating Area

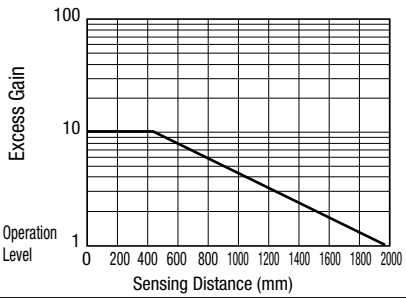


Sensing Distance vs. Object Size

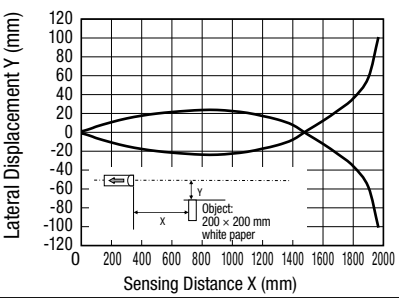


(5) Diffuse-reflective SA2E-DL☐ (1m)

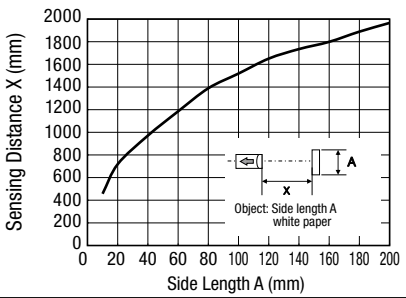
Excess Gain vs. Sensing Distance



Operating Area

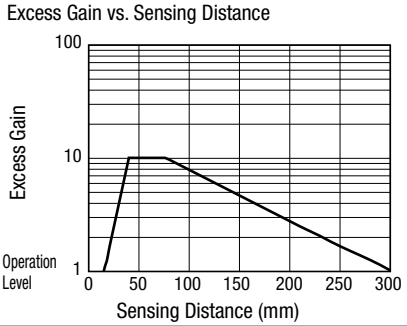


Sensing Distance

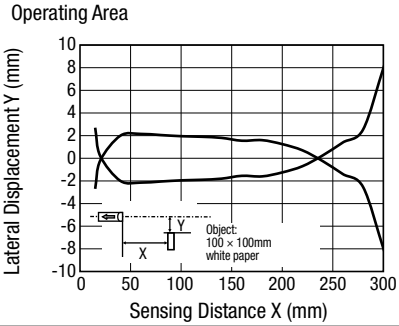


(6) Small-beam Reflective SA2E-N☐

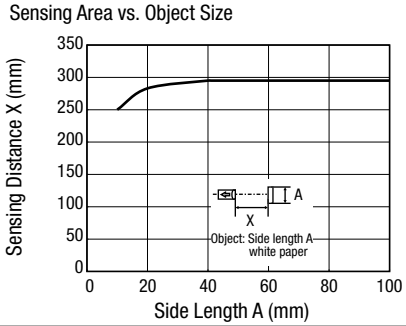
Excess Gain vs. Sensing Distance



Operating Area



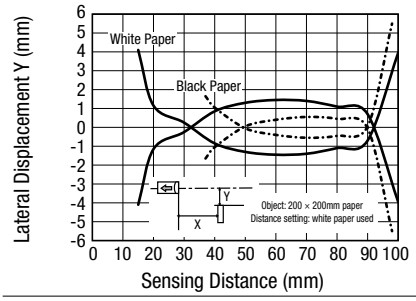
Sensing Area vs. Object Size



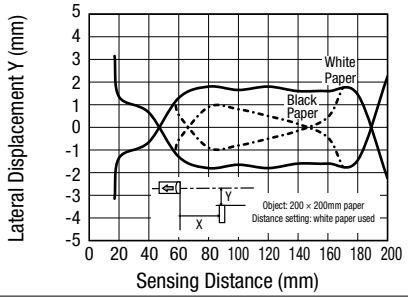
Characteristics (SA2E/SA1E)

(7) Background Suppression (BGS) SA2E-B☐

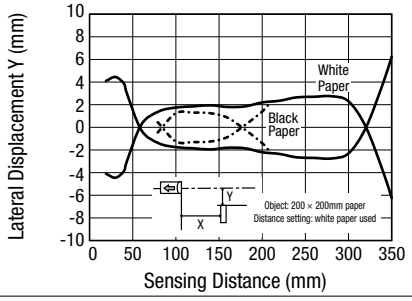
Operating Area (Preset 100 mm)



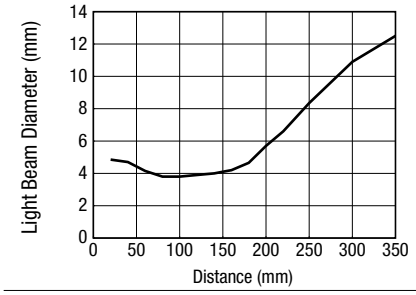
Operating Area (Preset 200 mm)



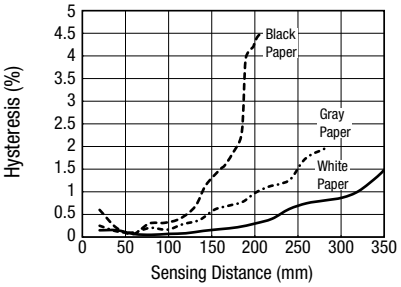
Operating Area (Preset 350 mm)



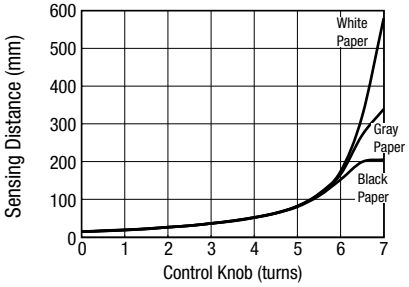
Light Beam Diameter vs. Sensing Distance



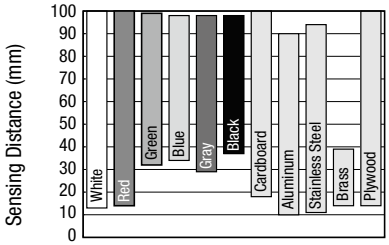
Hysteresis vs. Sensing Distance



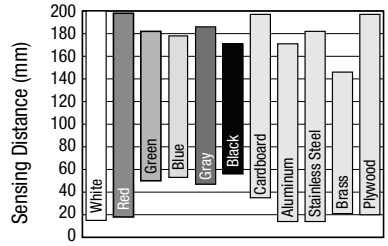
Sensing Distance vs. Control Knob



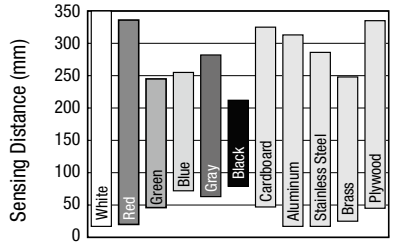
Color (200×200mm paper), material vs. Sensing Distance (Preset 100mm)



Color (200×200mm paper), material vs. Sensing Distance (Preset 200mm)

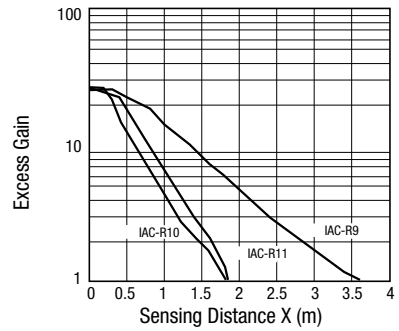


Color (200×200mm paper), material vs. Sensing Distance (Preset 350mm)

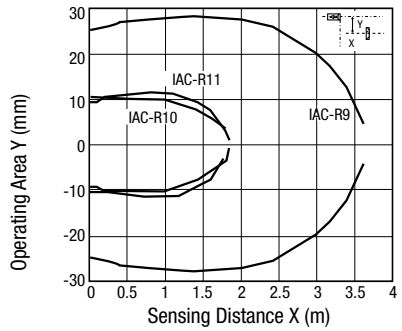


(8) Coaxial Polarized Retro-reflective (Transparent Object Sensing) (SA1E-X☐)

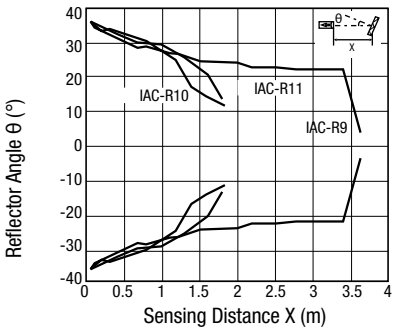
Excess Gain vs. Sensing Distance



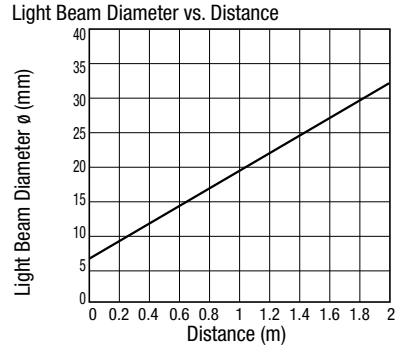
Operating Area



Angle



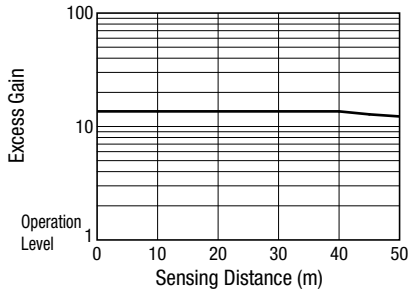
Light Beam Diameter vs. Distance



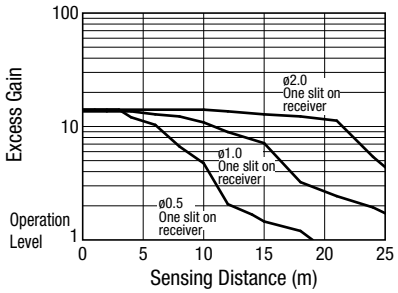
Characteristics (Typical) (SA1E–L)

(1) Through-beam SA1E-LT☐

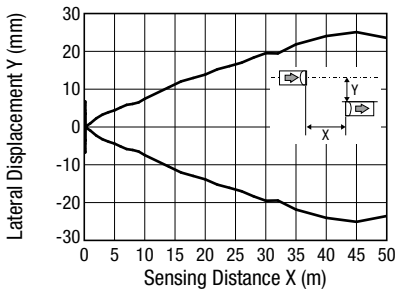
Excess Gain (Without slit)



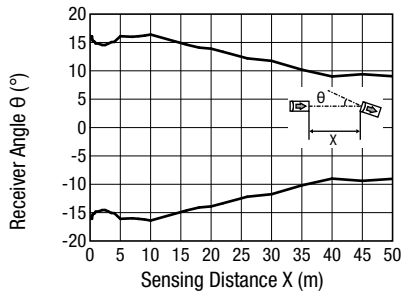
Excess Gain (With slit)



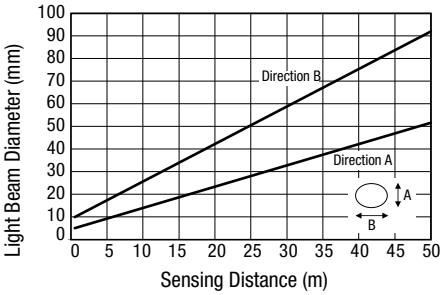
Lateral Displacement (Without slit)



Angle (without slit)



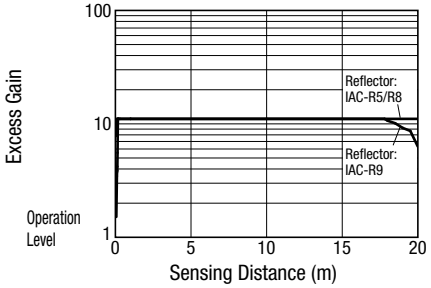
Light Beam Diameter



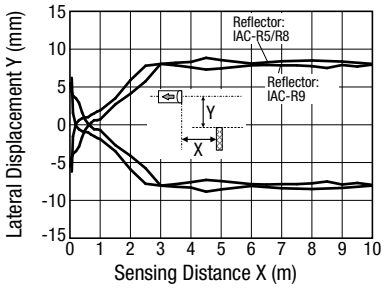
(Light beam diameter)
Reference value (visual inspection)

(2) Polarized Retro-reflective SA1E-LP☐

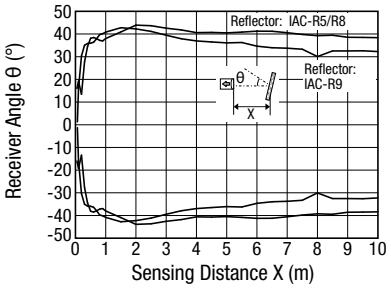
Excess Gain



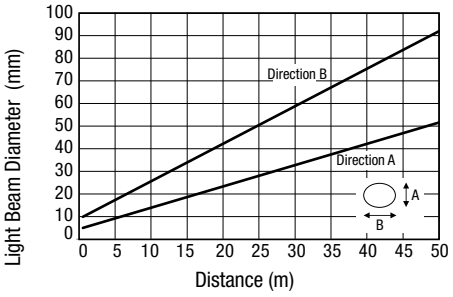
Lateral Displacement



Angle



Light Beam Diameter

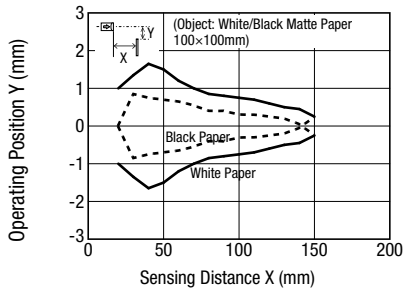


(Light beam diameter)
Reference value (visual inspection)

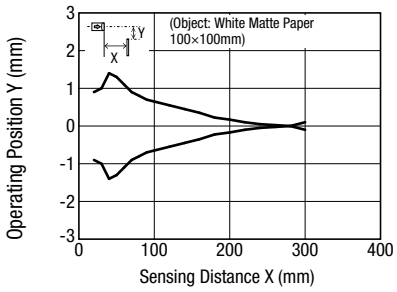
Characteristics (Typical) (SA1E–L)

(3) Background Suppression (BGS) SA1E-LB☐

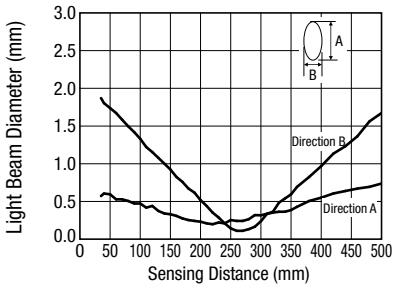
Operating Area (Preset 150mm)



Operating Area (Preset 300mm)

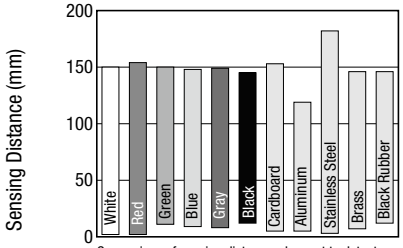


Light Beam Diameter



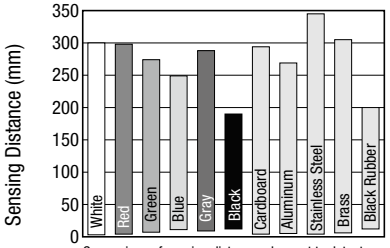
Light beam diameter:
Defined as 1/e2 (13.5%) of the center intensity

Color (100×100mm matte paper), material vs, Sensing Distance (Preset 150mm)



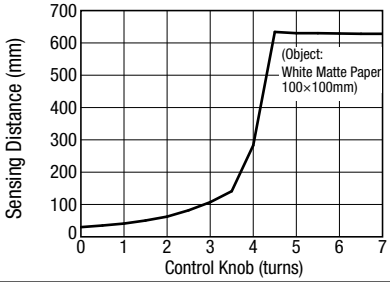
Comparison of sensing distance when set to detect white matte paper at 150mm

Color (100×100mm matte paper), material vs. Sensing Distance (Preset 300mm)



Comparison of sensing distance when set to detect white matte paper at 300mm

Sensing Distance vs. Control Knob



Accessories (SA2E/SA1E) (optional)

Slits (for through-beam)

When ordering, specify the Ordering No.

Item	Slit Size	Part No.	Ordering No.	Package Quantity
Vertical Slit	0.5mm × 18mm	SA9Z-S06	SA9Z-S06PN02	2
	1.0mm × 18mm	SA9Z-S07	SA9Z-S07PN02	
	2.0mm × 18mm	SA9Z-S08	SA9Z-S08PN02	
Horizontal Slit	0.5mm × 6.5mm	SA9Z-S09	SA9Z-S09PN02	
	1.0mm × 6.5mm	SA9Z-S10	SA9Z-S10PN02	
	2.0mm × 6.5mm	SA9Z-S11	SA9Z-S11PN02	
Round Slit	ø0.5mm	SA9Z-S12	SA9Z-S12PN02	
	ø1.0mm	SA9Z-S13	SA9Z-S13PN02	
	ø2.0mm	SA9Z-S14	SA9Z-S14PN02	

Reflectors (for polarized retro-reflective)

Package Quantity: 1

Item		Part No. (Ordering No.)
Reflector	Standard	IAC-R5
	Small	IAC-R6
	Large	IAC-R8
	Narrow (rear/side mounting)	IAC-R7M
	Narrow (rear mounting)	IAC-R7B
	Narrow (side mounting)	IAC-R7S
	Tape Type (40 × 35mm)	IAC-RS1
	Tape Type (80 × 70mm)	IAC-RS2
Reflector Mounting Bracket	For IAC-R5	IAC-L2
	For IAC-R6	IAC-L3
	For IAC-R8	IAC-L5

* See P25 for dimensions.

- **IAC-L2** is not supplied with mounting screws and nuts. Use commercially available M4 screws and nuts for mounting the IAC-R5 reflector.
- **IAC-L3** is supplied with two mounting screws (M3 × 8mm sems screws).
- **IAC-L5** is supplied with two mounting screws (M4 × 10mm sems screws).
- **IAC-R7M** and **IAC-R7S** are supplied with two M3 × 8mm self-tapping screws, two flat washers, and two spring washers. **IAC-R7B** is supplied with an M3 × 8mm self-tapping screw, a flat washer, and a spring washer.

Reflectors(used only for coaxial polarized retro-reflective)

Package Quantity: 1

Item		Part No. (Ordering No.)
Reflector	Standard	IAC-R9
	Small	IAC-R10
	Ultra-small	IAC-R11
Reflector Mounting Bracket	For IAC-R9	IAC-L3

Mounting Brackets

Package Quantity: 1

Item		Part No. (Ordering No.)
Main Unit Mounting Bracket	Vertical Mounting	SA9Z-K01
	Horizontal Mounting	SA9Z-K02
	Cover type	SA9Z-K03
	Back Mounting	SA9Z-K04

- Two mounting screws (M3 × 12mm sems screws) are supplied with the **SA9Z-K01** and **SA9Z-K02**. Two mounting screws (M3 × 14mm sems screws) are supplied with the **SA9Z-K03**.
- The through-beam model requires two mounting brackets, one each for the projector and the receiver.
- **SA9Z-K02** cannot be used for the connector models.
- Contact IDEC for mounting brackets for the connector.

Air Blower Mounting Block

Package Quantity: 1

Item	Part No. (Ordering No.)
Air Blower Mounting Block	SA9Z-A02

- Two mounting screws (M3 × 20mm sems screws), one M5 × 6mm screw for plugging the air supply port, and one gasket (0.5mm thick) are supplied.
  The air tube fitting and mounting bracket are not supplied and must be ordered separately. (Recommended mounting bracket: **SA9Z-K01**)
- Material: Anodized aluminum surface

Connector Cable (for M8 connector model)

Package Quantity: 1

Number of Core Wires	Style & Length	Part No. (Ordering No.)
4	Straight, 2m	SA9Z-CM8K-4S2
	Straight, 5m	SA9Z-CM8K-4S5
	Right angle, 2m	SA9Z-CM8K-4L2
	Right angle, 5m	SA9Z-CM8K-4L5

Sensitivity Control Screwdriver

Package Quantity: 1

Item	Part No. (Ordering No.)
Sensitivity Control Screwdriver 	SA9Z-AD01

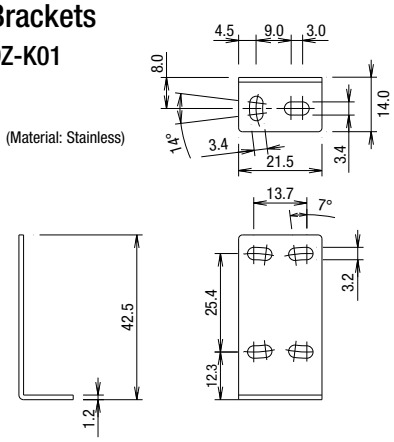
Accessory Dimensions (SA2E/SA1E) (optional)

All dimensions in mm

Mounting Brackets

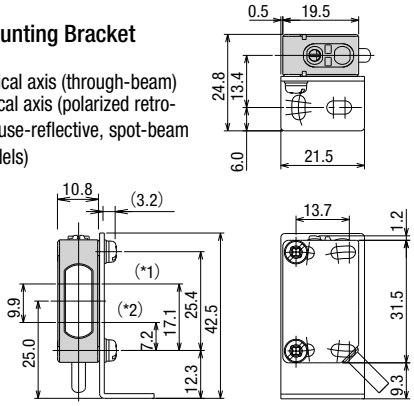
SA9Z-K01

(Material: Stainless)



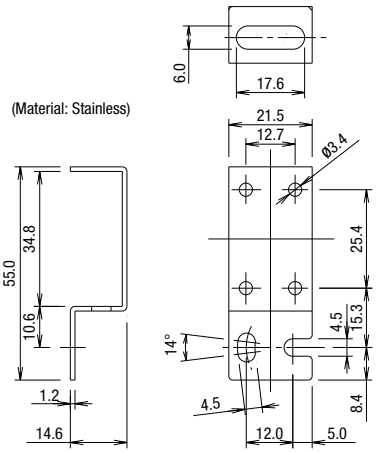
With Mounting Bracket

*1: Center of optical axis (through-beam)
*2:Center of optical axis (polarized retro-reflective, diffuse-reflective, spot-beam reflective models)



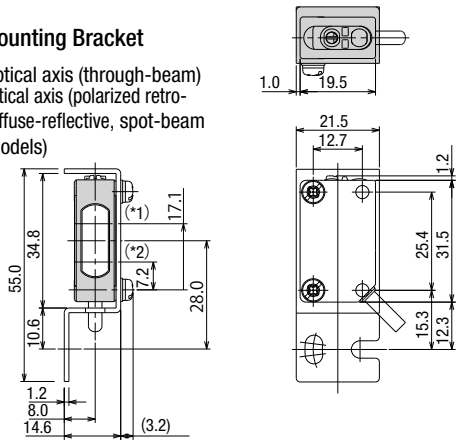
SA9Z-K02

(Material: Stainless)



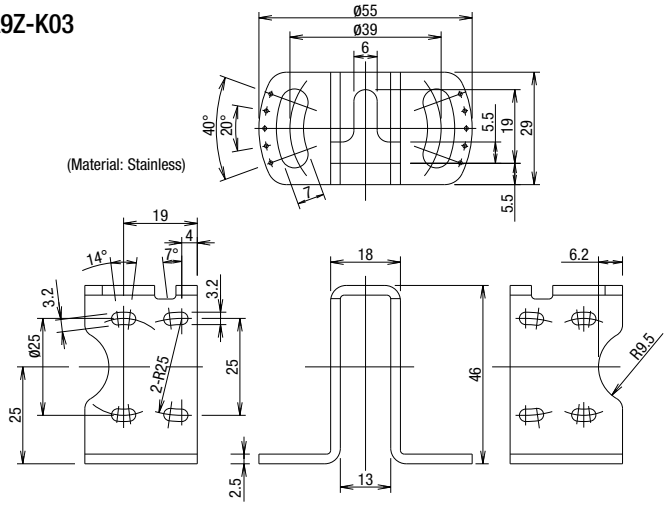
With Mounting Bracket

*1: Center of optical axis (through-beam)
*2: Center of optical axis (polarized retro-reflective, diffuse-reflective, spot-beam reflective models)

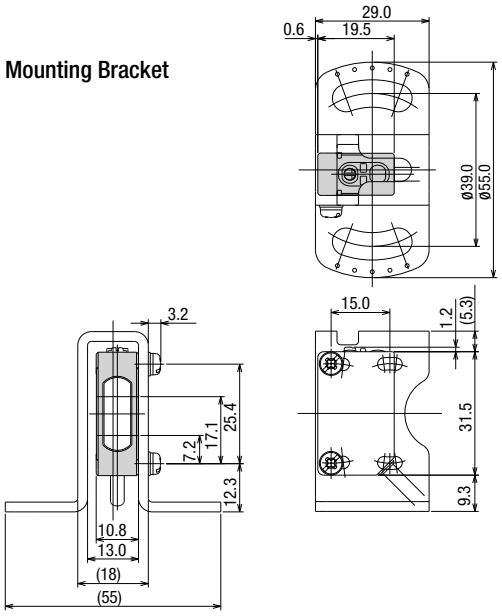


SA9Z-K03

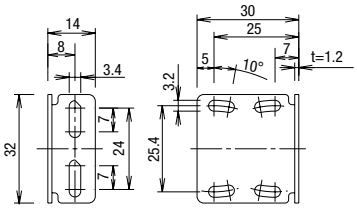
(Material: Stainless)



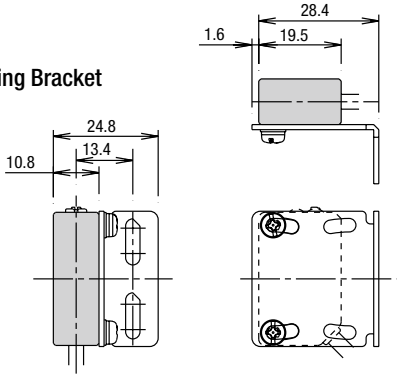
With Mounting Bracket



SA9Z-K04



With Mounting Bracket

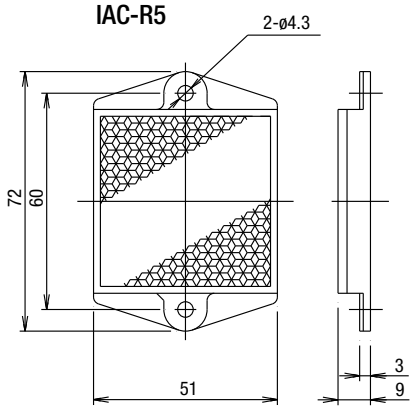


Accessory Dimensions (SA2E/SA1E) (optional)

All dimensions in mm

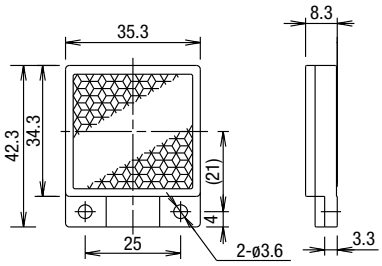
Reflectors

IAC-R5



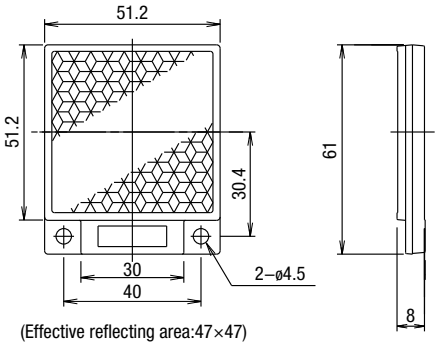
(Effective reflecting area: 47.2×47.2)

IAC-R6



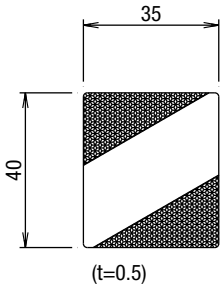
(Effective reflecting area: 30×31)

IAC-R8



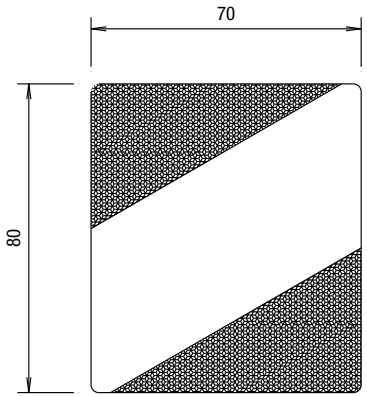
(Effective reflecting area:47×47)

IAC-RS1



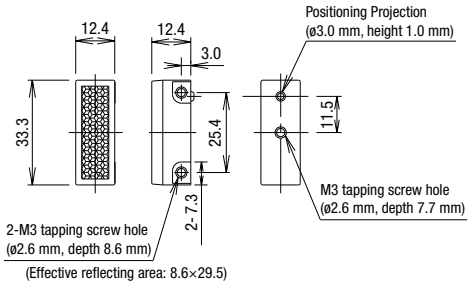
(t=0.5)

IAC-RS2



(t=0.5)

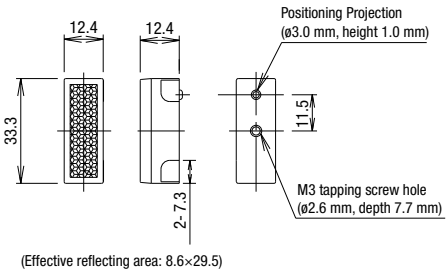
IAC-R7M (rear/side mounting)



(Effective reflecting area: 8.6×29.5)

Note:The mounting plate for reflector must be 0.8 to 2.5mm in thickness.

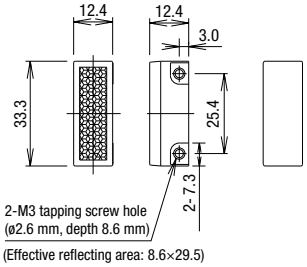
IAC-R7B (rear mounting)



(Effective reflecting area: 8.6×29.5)

Note:The mounting plate for reflector must be 0.8 to 2.5mm in thickness.

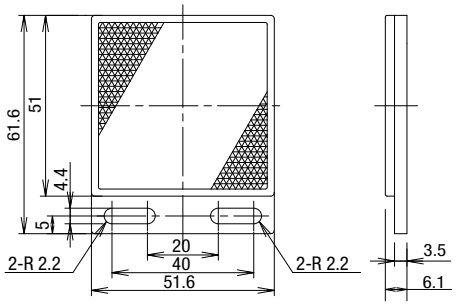
IAC-R7S (side mounting)



(Effective reflecting area: 8.6×29.5)

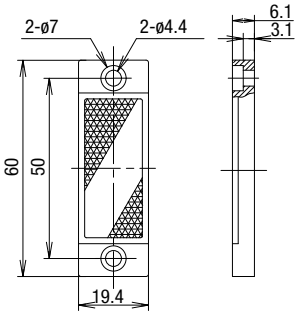
Note:The mounting plate for reflector must be 0.8 to 2.5mm in thickness.

IAC-R9



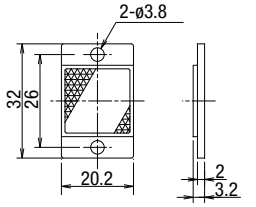
(Effective reflecting area: 47×47.6)

IAC-R10



(Effective reflecting area: 38.5×16)

IAC-R11



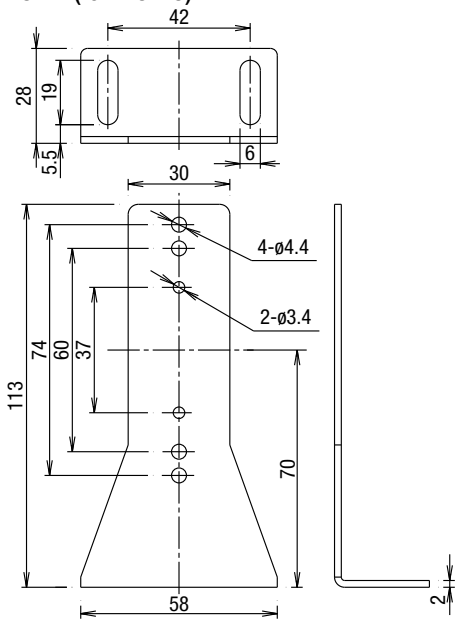
(Effective reflecting area: 18×18.2)

Accessory Dimensions (SA2E/SA1E) (optional)

All dimensions in mm.

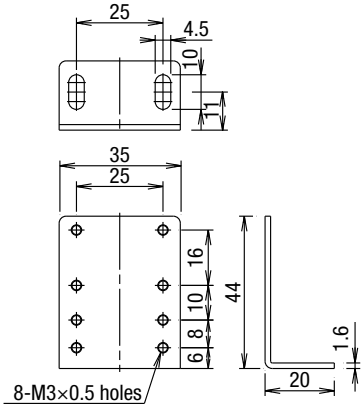
Reflector Mounting Brackets

IAC-L2 (for IAC-R5)



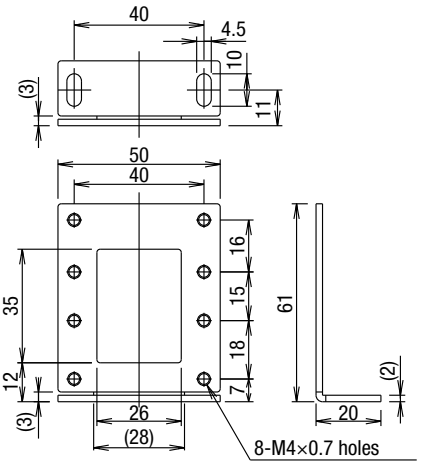
Material: SPCC

IAC-L3 (for IAC-R6)



Material: SPCC

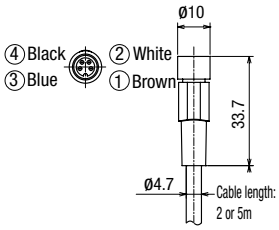
IAC-L5 (for IAC-R8)



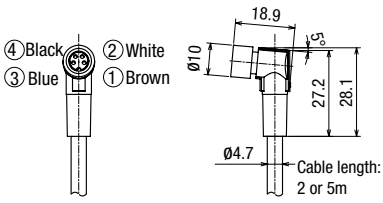
Material: SPCC

Connector Cable (connector on one end)

Straight
SA9Z-CM8K-4S□



Right-angle
SA9Z-CM8K-4L□



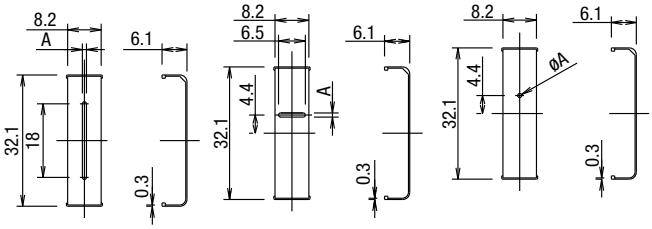
Note: Dielectric strength when installed on the unit: 1000V AC (between live part and mounting bracket, except between live part and tightening ring)

Slit Dimensions

Vertical Slit
SA9Z-S06
SA9Z-S07
SA9Z-S08

Horizontal Slit
SA9Z-S09
SA9Z-S10
SA9Z-S11

Round Slit
SA9Z-S12
SA9Z-S13
SA9Z-S14

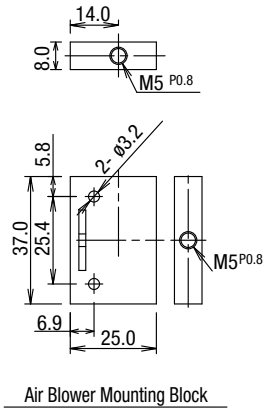


Material: Stainless Steel | Material: Stainless Steel | Material: Stainless Steel

Note: For slit width A, see P13.

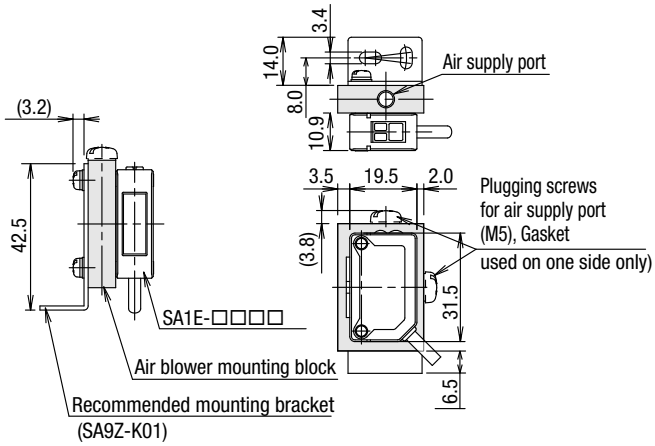
Air Blower Mounting Block

SA9Z-A02



Air Blower Mounting Block

With Mounting Bracket



- The SA9Z-A02 air blower mounting block is supplied with two mounting screws (M3 × 20mm sems screws), one screw for plugging the air supply port (M5 × 6 mm), and one gasket for plugging the air supply port (1mm thick).
- An air tube fitting (M5) can be installed to either the top or side.
  Tighten the fitting to a torque of 0.5 N·m maximum.
- The air tube fitting and mounting bracket are not supplied and must be ordered separately. (Recommended mounting bracket: **SA9Z-K01**)

Material: Anodized aluminum surface

⚠ Safety Precautions

- Be sure to turn off the power before performing installation, removal, wiring, maintenance, or inspection work. Failure to do so could result in electric shock and fire.

Operating Instructions

Read the instruction manual carefully before performing installation, wiring, maintenance, and inspection work, and before operating this product. Be sure to use the product correctly.

For details about mounting methods, wiring, and maintenance, see the instruction manuals at the following URLs.

URL SA2E ---------- https://product.idec.com/?product=SA2E
SA1E ---------- https://product.idec.com/?product=SA1E-T

SA2E SA1E-T

Installation

- Do not install the sensors in areas subject to the following conditions. Otherwise malfunction and damage might occur.
  1) Inductive devices or heat sources
  2) Extreme vibration or shock
  3) Large amount of dust
  4) Harmful gases
  5) Water, oil, chemicals
  6) Outdoors
- Make sure to prevent sunlight, fluorescent light, and especially the fluorescent light of inverters from entering the receiver of the photoelectric switch directly. Keep the through-beam model receiver away from intense extraneous light.
- Interference prevention allows two photoelectric sensors to be mounted in close proximity. However, the through-beam model is not equipped with interference prevention. Maintain appropriate distance between the sensors referring to the lateral displacement characteristics.
- Because the photoelectric sensors are IP67 waterproof, the sensors can be exposed to water. However, wipe water drops and smears from the lens and slit using a soft cloth to make sure of the best detecting performance.
- Polycarbonate or acrylic resins are used for optical elements. Do not use ammonia or caustic soda for cleaning, otherwise the optical elements will be dissolved. To remove dust and moisture build-up, use a soft, dry cloth.
- Tighten the mounting screws (M3) to a torque of 0.5 N·m. Do not tighten the mounting screws excessively or hit the switch with a hammer, otherwise the protection degree cannot be maintained.

Product Information

USB Powered Portable Sensor Checker

SA1P

Easily connects 24V DC devices at any location. An external USB battery can be used enabling easy device testing and continuity check for 24V DC devices without power outlets near by. Connects to PCs using a USB connector.

Photoelectric Sensors

SA1U

Universal voltage types operate on 24-240V AC and 12-240V DC. DC power types operate on 12-24V DC. Four sensing methods (through-beam, polarized retro-reflective, diffuse-reflective, and background suppression).

Magnetic Proximity Sensors

DPRI

The DPRI magnetic proximity switch incorporates a sealed reed switch and four magnets inside a compact housing. This self-contained proximity switch requires no external power supply and can detect the presence of magnetic objects without contact.

Ordering Terms and Conditions

Thank you for using IDEC Products.

By purchasing products listed in our catalogs, datasheets, and the like (hereinafter referred to as "Catalogs") you agree to be bound by these terms and conditions. Please read and agree to the terms and conditions before placing your order.

1. Notes on contents of Catalogs

(1) Rated values, performance values, and specification values of IDEC products listed in this Catalog are values acquired under respective conditions in independent testing, and do not guarantee values gained in combined conditions.
Also, durability varies depending on the usage environment and usage conditions.

(2) Reference data and reference values listed in Catalogs are for reference purposes only, and do not guarantee that the product will always operate appropriately in that range.

(3) The specifications / appearance and accessories of IDEC products listed in Catalogs are subject to change or termination of sales without notice, for improvement or other reasons.

(4) The content of Catalogs is subject to change without notice.

2. Note on applications

(1) If using IDEC products in combination with other products, confirm the applicable laws / regulations and standards.
Also, confirm that IDEC products are compatible with your systems, machines, devices, and the like by using under the actual conditions. IDEC shall bear no liability whatsoever regarding the compatibility with IDEC products.

(2) The usage examples and application examples listed in Catalogs are for reference purposes only. Therefore, when introducing a product, confirm the performance and safety of the instruments, devices, and the like before use. Furthermore, regarding these examples, IDEC does not grant license to use IDEC products to you, and IDEC offers no warranties regarding the ownership of intellectual property rights or non-infringement upon the intellectual property rights of third parties.

(3) When using IDEC products, be cautious when implementing the following.

i. Use of IDEC products with sufficient allowance for rating and performance

ii. Safety design, including redundant design and malfunction prevention design that prevents other danger and damage even in the event that an IDEC product fails

iii. Wiring and installation that ensures the IDEC product used in your system, machine, device, or the like can perform and function according to its specifications

(4) Continuing to use an IDEC product even after the performance has deteriorated can result in abnormal heat, smoke, fires, and the like due to insulation deterioration or the like. Perform periodic maintenance for IDEC products and the systems, machines, devices, and the like in which they are used.

(5) IDEC products are developed and manufactured as general-purpose products for general industrial products. They are not intended for use in the following applications, and in the event that you use an IDEC product for these applications, unless otherwise agreed upon between you and IDEC, IDEC shall provide no guarantees whatsoever regarding IDEC products.

i. Use in applications that require a high degree of safety, including nuclear power control equipment, transportation equipment (railroads / airplanes / ships / vehicles / vehicle instruments, etc.), equipment for use in outer space, elevating equipment, medical instruments, safety devices, or any other equipment, instruments, or the like that could endanger life or human health

ii. Use in applications that require a high degree of reliability, such as provision systems for gas / waterworks / electricity, etc., systems that operate continuously for 24 hours, and settlement systems

iii. Use in applications where the product may be handled or used deviating from the specifications or conditions / environment listed in the Catalogs, such as equipment used outdoors or applications in environments subject to chemical pollution or electromagnetic interference
If you would like to use IDEC products in the above applications, be sure to consult with an IDEC sales representative.

3. Inspections

We ask that you implement inspections for IDEC products you purchase without delay, as well as thoroughly keep in mind management/maintenance regarding handling of the product before and during the inspection.

4. Warranty

(1) Warranty period

The warranty period for IDEC products shall be one (1) year after purchase or delivery to the specified location. However, this shall not apply in cases where there is a different specification in the Catalogs or there is another agreement in place between you and IDEC.

(2) Warranty scope

Should a failure occur in an IDEC product during the above warranty period for reasons attributable to IDEC, then IDEC shall replace or repair that product, free of charge, at the purchase location / delivery location of the product, or an IDEC service base. However, failures caused by the following reasons shall be deemed outside the scope of this warranty.

i. The product was handled or used deviating from the conditions / environment listed in the Catalogs

ii. The failure was caused by reasons other than an IDEC product

iii. Modification or repair was performed by a party other than IDEC

iv. The failure was caused by a software program of a party other than IDEC

v. The product was used outside of its original purpose

vi. Replacement of maintenance parts, installation of accessories, or the like was not performed properly in accordance with the user's manual and Catalogs

vii. The failure could not have been predicted with the scientific and technical standards at the time when the product was shipped from IDEC

viii. The failure was due to other causes not attributable to IDEC (including cases of force majeure such as natural disasters and other disasters)

Furthermore, the warranty described here refers to a warranty on the IDEC product as a unit, and damages induced by the failure of an IDEC product are excluded from this warranty.

5. Limitation of liability

The warranty listed in this Agreement is the full and complete warranty for IDEC products, and IDEC shall bear no liability whatsoever regarding special damages, indirect damages, incidental damages, or passive damages that occurred due to an IDEC product.

6. Service scope

The prices of IDEC products do not include the cost of services, such as dispatching technicians. Therefore, separate fees are required in the following cases.

(1) Instructions for installation / adjustment and accompaniment at test operation (including creating application software and testing operation, etc.)

(2) Maintenance inspections, adjustments, and repairs

(3) Technical instructions and technical training

(4) Product tests or inspections specified by you

The above content assumes transactions and usage within your region. Please consult with an IDEC sales representative regarding transactions and usage outside of your region. Also, IDEC provides no guarantees whatsoever regarding IDEC products sold outside your region.

IDEC CORPORATION

Head Office 6-64, Nishi-Miyahara-2-Chome, Yodogawa-ku, Osaka 532-0004, Japan

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		India	IDEC Controls India Private Ltd.	**Taiwan**	IDEC Taiwan Corporation		

EP1750-2

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