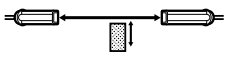
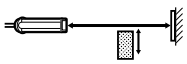
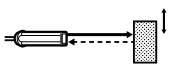
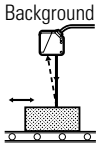
SA1U Heavy Duty Photoelectric Sensors

Key features:

- Universal voltage
  AC Universal Type: 24 to 240V AC and 12 to 240V DC.
  DC Type: 12 to 24V DC.
- IP67 rated
- Four sensing methods: through-beam, polarized retro-reflective, diffuse-reflective, and background suppression.
- Mounting hole centers: 40, 50 to 55 mm
- Operation and stable LED indicators.
- SPDT contact for relay output type.
- Transistor output type has NPN and PNP open collector dual outputs.
- Interference prevention allows two units to be mounted in close proximity (except through-beam type).
- Spring-up terminal block structure enables easy wiring. Wiring can be extended to up to 100m using ø8 to ø10 mm round cables.

Part Numbers

Sensing Method	Detectable Object	Sensing Range	Power Voltage	Control Output	Time Delay Functions	Part No.
Through-Beam 	Opaque	50m max.	24 to 240V AC (50/60Hz) 12 to 240V DC	Relay contact SPDT 250V AC/3A, 30V DC/3A (resistive load)	Without	SA1U-T50M
					With	SA1U-T50MT
			12 to 24V DC	NPN/PNP open collector	Without	SA1U-T50MW
					With	SA1U-T50MWT
Polarized Retroreflective 	Opaque Mirror surface	7m max.	24 to 240V AC (50/60Hz) 12 to 240V DC	Relay contact SPDT 250V AC/3A, 30V DC/3A (resistive load)	Without	SA1U-P07M
					With	SA1U-P07MT
			12 to 24V DC	NPN/PNP open collector	Without	SA1U-P07MW
					With	SA1U-P07MWT
Diffuse 	Opaque Transparent	1m max.	24 to 240V AC (50/60Hz) 12 to 240V DC	Relay contact SPDT 250V AC/3A, 30V DC/3A (resistive load)	Without	SA1U-D01M
					With	SA1U-D01MT
			12 to 24V DC	NPN/PNP open collector	Without	SA1U-D01MW
					With	SA1U-D01MWT
Background Suppression 	Opaque	2m max.	24 to 240V AC (50/60Hz) 12 to 240V DC	Relay contact SPDT 250V AC/3A, 30V DC/3A (resistive load)	Without	SA1U-B02M
					With	SA1U-B02MT
			12 to 24V DC	NPN/PNP open collector	Without	SA1U-B02MW
					With	SA1U-B02MWT

Specifications

Universal Voltage Models

Sensing Method	Through-Beam	Polarized Retroreflective	Diffuse	Background Suppression
Part Number	SA1U-T50M SA1U-T50MT	SA1U-P07M SA1U-P07MT	SA1U-D01M SA1U-D01MT	SA1U-B02M SA1U-B02MT
Power Voltage	24 to 240V AC (21.6 to 264V AC) 50/60Hz, 12 to 240V DC (10.8 to 264V DC) compatible			
Power Consumption	Projector: 3 VA maximum Receiver: 3 VA maximum	3 VA maximum		
Control Output	Relay contact SPDT, switching capacity: 250V AC/3A (resistive load), 30V DC/3A (resistive load) Electrical life (minimum operations): 100,000 (NO contact), 50,000 (NC contact) Mechanical life (minimum operations): 50,000,000			
Minimum Applicable Load	5V DC, 10 mA minimum (reference value)			
Response Time	20 ms maximum			
Insulation Resistance	Between power and output terminals: 20 MΩ minimum (500V DC megger)			
Dielectric Strength	Between power and output terminals: 1500V AC, 1 minute, Between output terminals: 750V AC, 1 minute			
Weight (approx.)	Projector: 115g, Receiver: 130g	130g		

DC Power Models

Sensing Method		Through-Beam	Polarized Retroreflective	Diffuse-Reflective	Background Suppression
Part Number		SA1U-T50MW SA1U-T50MWT	SA1U-P07MW SA1U-P07MWT	SA1U-D01MW SA1U-D01MWT	SA1U-B02MW SA1U-B02MWT
Power Voltage		12 to 24V DC (10 to 30V DC) ripple rate 10% p-p maximum			
Current Draw		Projector: 20 mA maximum Receiver: 25 mA maximum	30 mA maximum		
Control Output	Type	NPN, PNP open collector (dual output)			
	Load Current	NPN: 100 mA maximum, PNP: 100 mA maximum			
	Applied Voltage	30V DC maximum			
	Voltage Drop	NPN: 2.4V maximum, PNP: 2.4V maximum			
Response Time		1 ms maximum			
Insulation Resistance		Between live and dead parts: 20 MΩ minimum (500V DC megger)			
Dielectric Strength		Between live and dead parts: 1000V AC, 1 minute			
Weight (approx.)		Projector: 105g, Receiver: 110g	110g		

Common Specifications

Sensing Method	Through-Beam	Polarized Retroreflective	Diffuse	Background Suppression
Sensing Distance	50m maximum	0.2 to 7m (when using supplied reflector IAC-R5)	1m maximum (200 × 200 mm white mat paper)	0.2 to 2m (200 × 200 mm white mat paper)
Preset Distance	—			0.4 to 2m (200 × 200 mm white mat paper)
Detectable Object	Opaque	Opaque/Mirror surface	Opaque/Transparent	Opaque
Hysteresis	—	—	20% of sensing distance max.	15% of sensing distance max.
Operation Mode	Light ON or Dark ON (mode selector)			
Control Output	[Projector] Power LED: Green [Receiver] Operation LED: Yellow Stable LED: Green	Operation LED: Yellow Stable LED: Green		Operation LED: Yellow
Light Emitting Element	Infrared LED (870 nm)	Red LED (660 nm)	Infrared LED (870 nm)	
Sensitivity Adjustment	1-turn control knob			8-turn control knob
Extraneous Light Immunity	Sunlight: 10,000 lux maximum, Incandescent lamp: 5,000 lux maximum			
Vibration Resistance	Damage limits: 10 to 55 Hz, amplitude 1.5 mm, 30 minutes in each axis			
Shock Resistance	Damage limits: 500 m/s^2, 3 shocks each in 6 axes 3 consecutive times			
Operating Temperature	–25 to +60°C (no freezing), storage temperature: –40 to +70°C			
Operating Humidity	35 to 85% RH (no condensation), storage humidity: 35 to 85% RH			
Connection Method	Terminal block with M3 spring-up screws			
Applicable Cable	Outside diameter ø8 to ø10 mm (core 0.3 to 0.75 mm^2)			
Cable Extension	Extendable up to 100m with a cabtyre cable of 0.3 mm^2 minimum			
Housing Material	PBT (indicator cover: PC)			
Lens Material	PC/PET	PMMA	PC/PET	
Degree of Protection	IP67 (IEC/EN60529)			

Time Delay Specifications

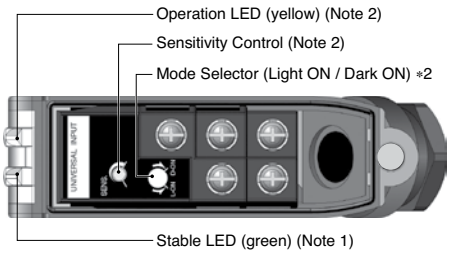
Sensing Method	Through-Beam	Polarized Retroreflective	Diffuse	Background Suppression
Type No.	SA1U-T50MT SA1U-T50MWT	SA1U-P07MT SA1U-P07MWT	SA1U-D01MT SA1U-D01MWT	SA1U-B02MT SA1U-B02MWT
Time Range	0.1 to 5.0 sec (adjusted with the 1-turn control knob)			
Time Delay Function	One shot, ON delay, OFF delay, and normal (no delay limit operation) modes			
Temperature Effect of Time Delay	±10% maximum of the time delay for 20°C temperature rise within the operating temperature range			
Repetitive Accuracy of Time Delay	±1.0% maximum of the time delay for repetitive inputs at 10 seconds or more			

Descriptions

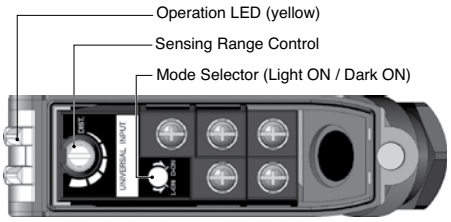
Without Time Delay

Part Numbers

SA1U-T50M∗
SA1U-P07M∗
SA1U-D01M∗



SA1U-B02M∗

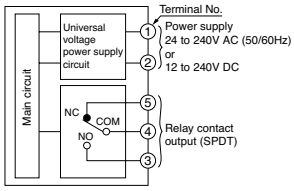


1. Power LED for through-beam projector
2. Not available on through-beam projector

Output Circuit / Connection Diagram

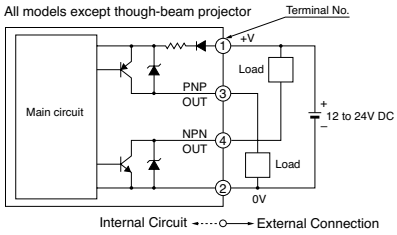
[Universal Voltage Type]

All models except though-beam projector

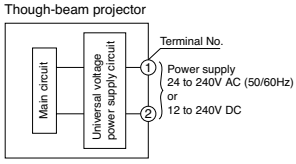


[DC Power Type]

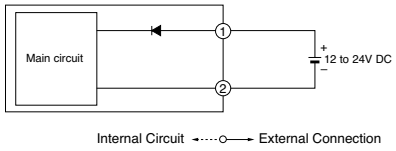
All models except though-beam projector



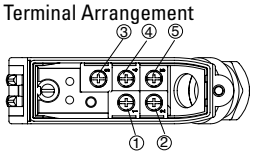
Though-beam projector



Though-beam projector

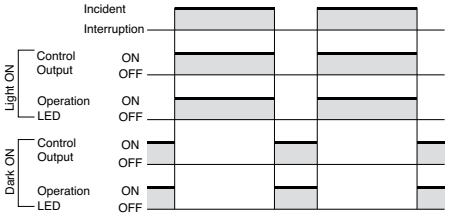


Terminal Arrangement



*Terminal ⑤ not available on DC power types.

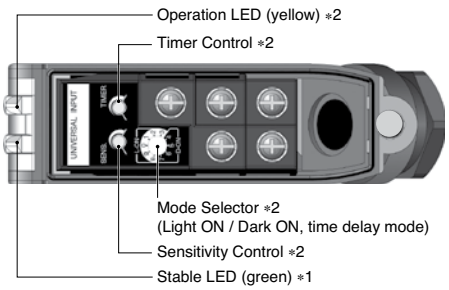
Operation Chart



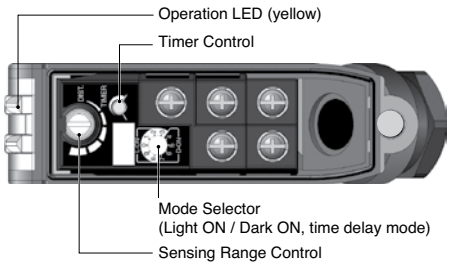
Without Time Delay

Part Numbers

SA1U-T50M∗T
SA1U-P07M∗T
SA1U-D01M∗T



SA1U-B02M∗T



1. Power LED for through-beam projector
2. Not available on through-beam projector

Output Circuit / Connection Diagram

See the "Output Circuit / Connection Diagram" diagram above.

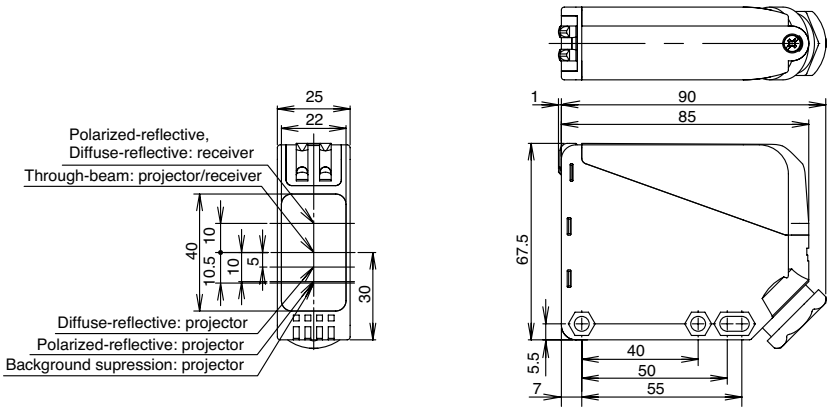
Terminal Arrangement

See the "Terminal Arrangement" diagram above.

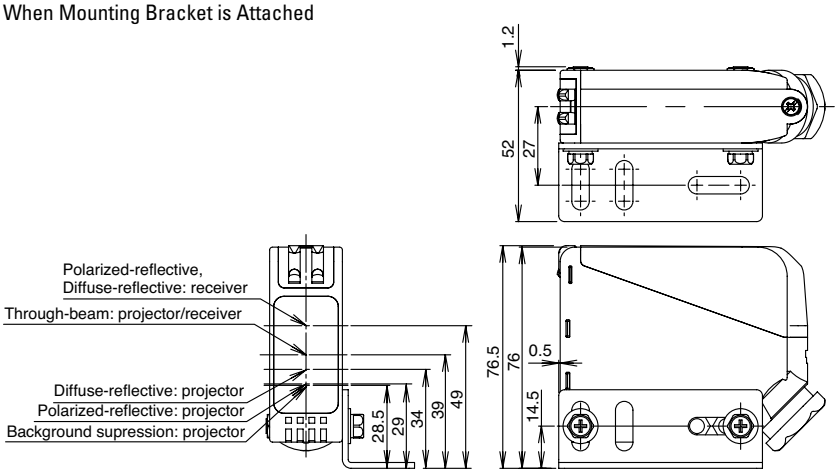
Operation Chart

	Operation Mode	Mode Selector Position	Incident / Interruption
Light ON	OFF delay	0	ON / OFF, T
	Normal	1	ON / OFF
	One shot	2	ON / OFF, T
	ON delay	3	ON / OFF, T
Dark ON	OFF delay	4	ON / OFF, T
	Normal	5	ON / OFF
	One shot	6	ON / OFF, T
	ON delay	7	ON / OFF, T
Light ON	Normal	8	ON / OFF
		9	

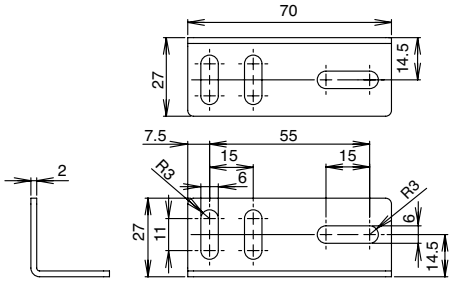
Dimensions (mm)



When Mounting Bracket is Attached



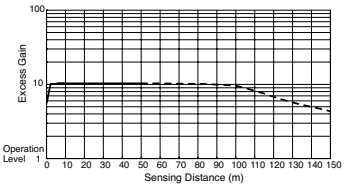
Mounting Bracket



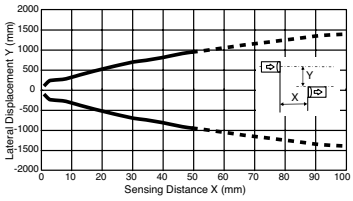
Characteristics (Typical)

Through-beam SA1U-T50M

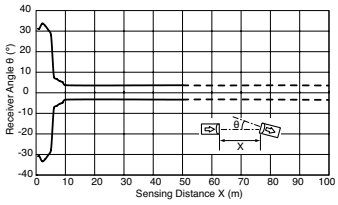
Excess Gain
(transparency 1% ND filter is used)



Lateral Displacement
(transparency 2.8% ND filter is used)

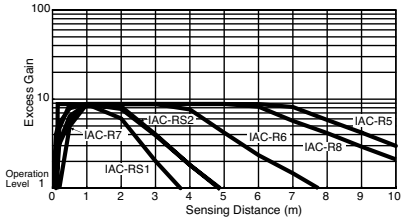


Angle

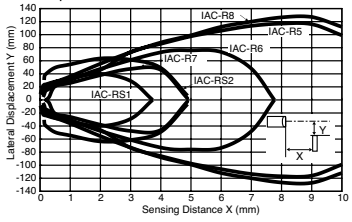


Polarized Retroreflective SA1U-P07M*

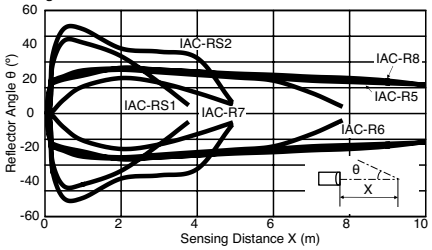
Excess Gain



Lateral Displacement



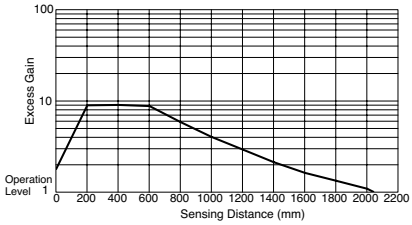
Angle



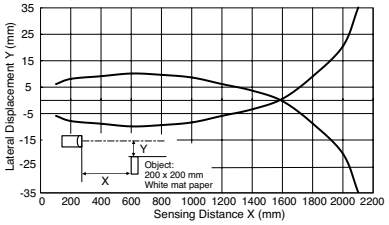
Characteristics (Typical)

Diffuse SA1U-D01M*

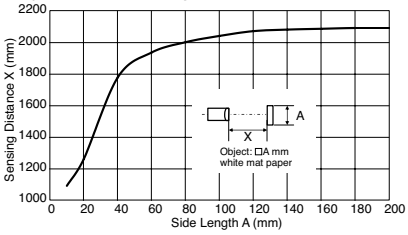
Excess Gain



Lateral Displacement

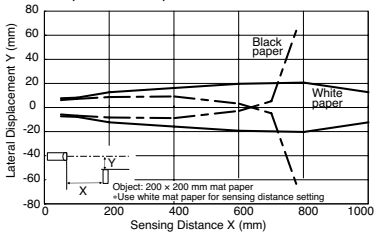


Object Size vs. Sensing Distance

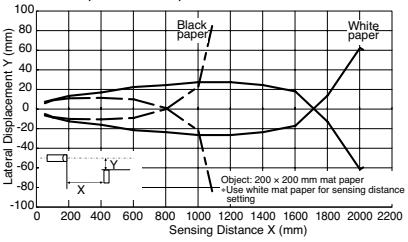


Background Suppression SA1U-B02M*

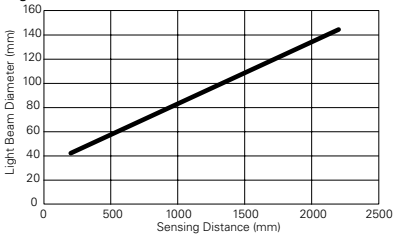
Lateral Displacement (preset 1m)



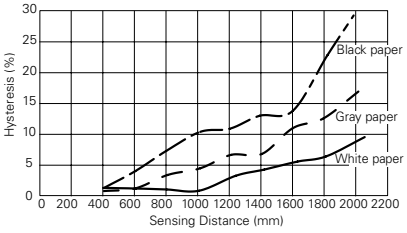
Lateral Displacement (preset 2m)



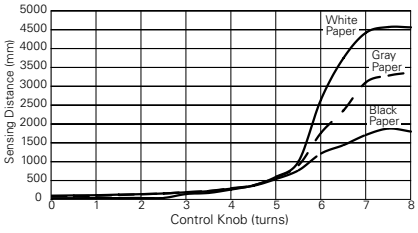
Light Beam Diameter



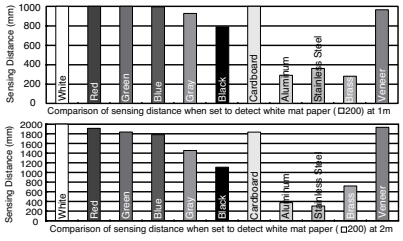
Sensing Distance vs. Hysteresis



Control Knob vs. Sensing Distance



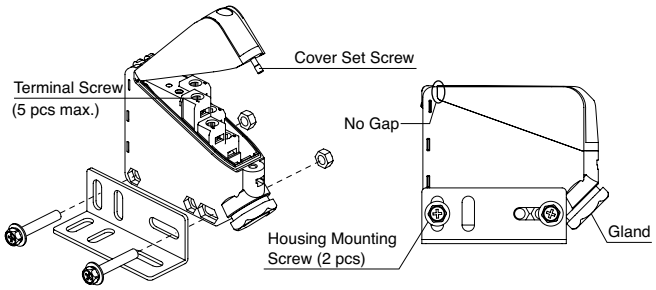
Color Mat Paper and Other Materials



Instructions

Installation

Make sure that there are no gaps between the cover and the housing as shown in the diagram below.



To maintain waterproof characteristics, tighten the screws within the range of the recommended tightening torque.

Excessive tightening may cause damage.

Screw Tightening Torque

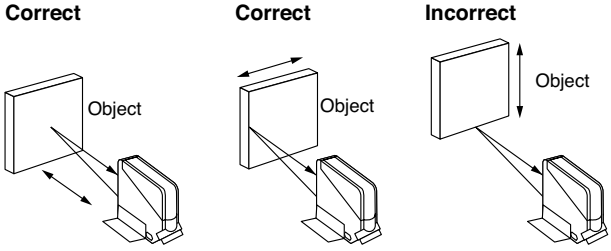
Screw	Recommended Tightening Torque (N·m)
Terminal screw	0.6 to 1.0
Gland	4.0 to 6.0
Cover set screw	0.5 to 0.8
Housing mounting screw	0.8 to 1.2

Notes

- When installing photoelectric switches, take into consideration the reflecting light from the floor or walls as it may affect sensing of through-beam and background suppression types.
- Make sure to prevent sunlight, fluorescent light, and fluorescent light of inverters from entering the receiver of the photoelectric switch directly. Keep the through-beam type receiver away from intense extraneous light.
- When installing SA1U photoelectric switches, do not tighten the mounting screws excessively or hit the switch with a hammer, otherwise the protection degree cannot be maintained.
- Make sure that the supply voltage is within the rated values.
- When using a switching regulator, be sure to ground the FG (frame ground) terminal.
- To suppress a transient state at start-up, a circuit to turn off the output is installed (universal voltage type: 50 ms, DC power type: 100 ms). The timer will start after resetting the off output.
- To meet European Union Low Voltage Directives, install an EN approved fuse on the outside of the power terminal or output terminal of the universal voltage type SA1U photoelectric switches.
- Attach the cover properly to maintain waterproof characteristics.
- Interference prevention allows two SA1U photoelectric switches to be mounted in close proximity. However, the through-beam type is not equipped with interference prevention. Maintain appropriate distance between the switches referring to the lateral displacement characteristics on pages 191 and 192.
- Polycarbonate or acrylic resins are used for optical elements. Do not use ammonia or caustic soda for cleaning, otherwise optical elements will dissolve. To remove dust and moisture build-up, use soft dry cloth.
- When mounting the reflector, do not tighten the mounting screws excessively, otherwise the screw hole of the reflector may be damaged.
- Use M4 mounting screws for the IAC-R5 and IAC-R8 reflectors and M3 mounting screws for the IAC-R6 reflector. Tighten the mounting screws to a tightening torque of 0.5 N·m maximum.
- Use the M3 self-tapping screw, flat washer, and spring washer to tighten the IAC-R7 reflector to a torque of 0.5 to 0.6 N·m. While optional reflector mounting bracket IAC-L2 is not supplied with mounting screws or nuts, the IAC-L3 and IAC-L5 are supplied with mounting screws for mounting the reflector on the bracket.
- IAC-RS1 and IAC-RS2 reflectors can be installed directly on a flat surface using the adhesive tape attached to the back of the reflector. Before attaching the reflector, clean the surface to ensure secure attachment.

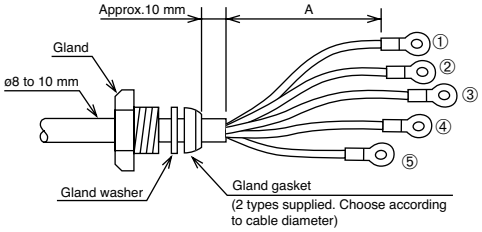
Installing the Background Suppression (BGS) Model

Install the sensor head as shown below to minimize sensing errors.



Wiring

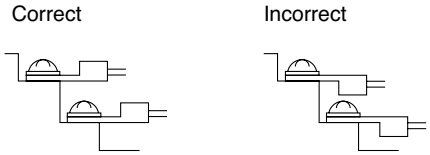
Connecting Cables



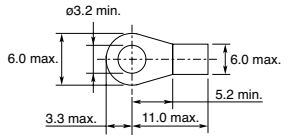
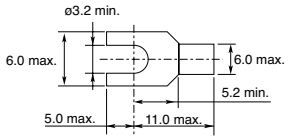
Recommended insulation length (A)

Terminal No.	①	②	③	④	⑤
Length "A" (mm)	45	30	55	40	25

- Connect the cables to the correct terminal number. Connect the lower terminal screws first.
- Attach the cover and secure with the set screw.
  To maintain waterproof and dustproof characteristics, use cabtyre cables (do not use soft cables as it may fall out) with ø8 to ø10 mm diameter. Install the attached gland gasket and washer and tighten the gland securely. For the small gland gasket, use a cable with ø8 to ø10 mm diameter. For the large gland gasket, use a cable with ø9 to ø10 mm diameter. The cable sheath should be 10 mm approx. Make sure that the gland washer fits in the groove of the gasket.
- When wiring, make sure that the power is turned off.
- Incorrect wiring may cause damage to the internal circuit.
- Avoid parallel wiring with high-voltage or power lines (especially inverters) in the same conduit, otherwise noise may cause malfunction and damage.
- When wiring is long or may be affected by power lines, use a separate conduit for wiring.
- Use a cable of 0.3 mm^2 minimum core wires. The cable can be extended up to 100m. For DC power types, voltage drop due to resistance of the cable lead wire should be taken into consideration.
- When using crimp terminals, make sure that the terminals do not come into contact with adjacent terminals. For correct installation, see the figure below.



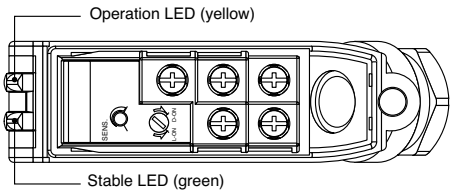
Dimension of Applicable Crimping Terminals

Ring Terminal	Spade Terminal
	

Dimensions in mm.

- When using insulation for ring terminals, use an insulating sheath.
- Install the insulation sheath to the crimp part before wiring.
- Only one crimp terminal can be connected per terminal.

Indicator and Output Operation



The operation LED turns on (yellow) when the control output is on. The stable LED turns on (green) either at stable incident or stable interruption. Make sure to use the SA1U photoelectric switch after the stable LED is on.

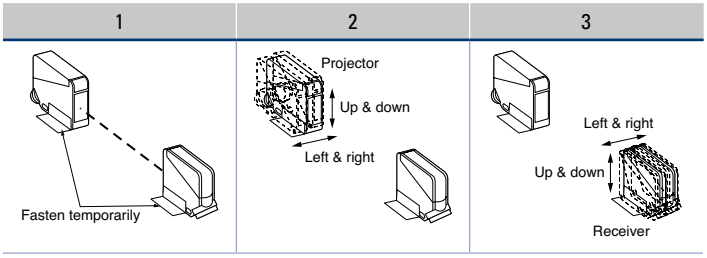
See the table below.

Light Receiving Status	Stable LED (green)	Operation LED (yellow)/ Control Output	
		Light ON	Dark ON
Stable Incident	ON	ON	OFF
UnstableIncident	OFF		
Unstable Interruption		OFF	ON
Stable Interruption	ON		

Optical Axis Alignment (Light ON)

1. Through-Beam Type

Fasten the receiver temporarily. Place the projector facing the receiver. Move the projector up, down, right and left to find the range where the operation LED turns on. Fasten the projector in the middle of the range. Next, move the receiver up, down, right, and left in the same manner and fasten in the middle of the range where the operation LED turns on. Make sure that stable LED turns on at stable incident and stable interruption.



2. Polarized Retroreflective

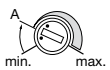
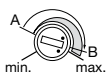
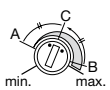
Install the reflector perpendicularly to the optical axis. Move the SA1U photoelectric switch up, down, right, and left to find the range where the operation LED turns on. Fasten the switch in the middle of the range. Polarized retroreflective type can be installed also by finding the position where the reflection of projected red light is most intense, while observing the reflection on the reflector from behind the switch. Make sure that stable LED turns on at stable incident and stable interruption.

3. Diffuse-Reflective

Place the SA1U photoelectric switch where the switch can detect an object. Move the switch up, down, right, and left to find the range where the operation LED tuns on. Fasten the switch in the middle of the range. Make sure that stable LED turns on at stable incident and stable interruption.

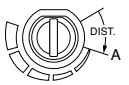
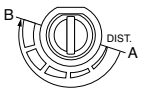
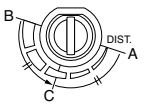
Sensitivity Adjustment (except Background Supression)

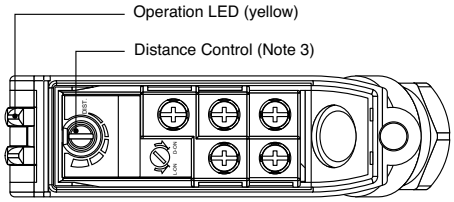
- Referring to the table below, adjust the sensitivity of the SA1U photoelectric switch when necessary, such as when the through-beam type is used to detect small or translucent objects or the reflective type is affected by background. The table explains the status of operation LED when the operation mode is set to light ON.
- After adjusting the sensitivity, make sure that stable LED turns on at stable incident and stable interruption.
- Sensitivity is set to the maximum at the factory before shipment.When adjusting the sensitivity, use the screwdriver supplied with the SA1U photoelectric switch to turn the control as shown below, to a torque of 0.03 N·m maximum.

Step	Photoelectric Switch Status	Sensitivity Control	Adjusting Procedure
1	Receiving light Through-beam, polarized reflective: No object detected Diffuse reflective: Object detected		Turn the control counterclockwise to the minimum. Then turn clockwise until the operation LED turns on (turns off with dark ON type) (point A).
2	Light is interrupted Through-beam, polarized reflective: Object detected Diffuse reflective: No object detected		At interruption status, turn the control clockwise from point A, until the operation LED turns on (turns off with dark ON type) (point B). If the operation LED does not turn on (turn off with dark ON type) even though the control has reached the maximum, set the maximum position as point B.
3	—		Set the middle point between point A and B as point C.

Adjustment of Sensing Range for Background Suppression

When adjusting the sensing range, follow the instruction below.

Step	Distance Control	Adjusting Procedure
1		Install the photoelectric switch and the object firmly. Turn the control counterclockwise until the operation LED turns off (turns on with dark ON type). From this point, turn the control clockwise until the operation LED turns on (turns off with dark ON type) (point A).
2		Remove the object, and confirm that the operation LED turns off (turns on with dark ON type). Turn the control clockwise until the operation LED turns on (detecting the background) (turns off with dark ON type) (point B). [1]
3		Set the middle point between point A and B as point C. [2]



1. When the background distance is too far and not detected, turn the control 360°, and set the point as point C.
2. Because the control is multi-turn, it may take more than one turn to move from point A to point B.
3. Turning the control clockwise lengthens the sensing distance.
4. Background suppression (BGS) type is not provided with a stable LED.

Accessories

Reflectors

Appearance	Item	Use with	Part Number
	Standard reflector	SA1E	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	SA1E-X	IAC-R9
	Small		IAC-R10
	Ultra-small		IAC-R11

Brackets

Appearance	Item	Use with	Part Number
	Vertical mounting bracket	SA1E	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
photo not available	Reflector mounting bracket		IAC-L5

Slits

Appearance	Item	Slit Size	Use with	Part Number	Min. Order Qty
	Vertical slit	0.5mm x 18mm	SA1E	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)

Appearance	Number of Core Wires	Type & Length	Use with	Part No.
	4	Straight, 2m	SA1E	SA9Z-CM8K-4S2
		Straight, 5m		SA9Z-CM8K-4S5
		Right angle, 2m		SA9Z-CM8K-4L2
		Right angle, 5m		SA9Z-CM8K-4L5
photo not available	4	2m	SA1C-F	SA9C-CA4D2
		5m		SA9C-CA4D5
		2m		SA9C-CA4D2S
		5m		SA9C-CA4D5S

Air Blower Mounting Blocks

Appearance	Item	Use with	Part Number
	Air blower mounting block	SA1E	SA9Z-A02

Sensitivity Control Screwdriver

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

Diffuse-Reflected Light Fiber Optic Units - SA9F

Appearance	Part Number	Description	Use with	Range
	**SA9F-DS31** No sleeve **SA9F-DS32** 3.54" (90mm) sleeve **SA9F-DS33** 1.77" (45mm) sleeve	Straight: Two fibers ø1mm (0.04") Threaded mount: ø6mm (M6) Detects: ø0.03mm (0.0012") minimum object	SA1C-FK3 SA1C-FK3G SA1C-F	60mm (2.36") 7mm (0.28")
	**SA9F-DC31** No sleeve **SA9F-DC32** 3.54" (90mm) sleeve **SA9F-DC33** 1.77" (45mm) sleeve (All three not compatible with green LED)	Coiled: Two fibers ø1mm (0.04") Threaded mount: ø6mm (M6) Detects: ø0.03mm (0.0012") minimum object	SA1C-FK3 SA1C-FK3G SA1C-F	25mm (0.98") —
	**SA9F-DT11** No sleeve **SA9F-DT12** 3.54" (90mm) sleeve **SA9F-DT13** 1.77" (45mm) sleeve (All three not compatible with green LED)	Straight: Two fibers ø0.5mm (0.02") Threaded mount: ø3mm (M3) Detects: ø0.03mm (0.0012") minimum object	SA1C-FK3 SA1C-FK3G SA1C-F	20mm (0.78") —
	**SA9F-DD31**	Coaxial: Core ø1mm (0.04") + 16 fibers: ø0.26mm (0.01") Threaded mount: ø6mm (M6) Detects: ø0.03mm (0.0012") minimum object	SA1C-FK3 SA1C-FK3G SA1C-F	60mm (2.36") 7mm (0.28")
	**SA9F-DM74** 1 row = 32 fibers **SA9F-DM75** 2 rows = 16 each (Not compatible with green LED)	Multicore: 32 fibers ø0.26mm (0.010") Detects: ø0.06mm (0.0024") minimum object	SA1C-FK SA1C-FK3G SA1C-F (not compatible with SA9F-DM75, SA9F-DM76)	60mm (2.36") 4mm (0.16")
	**SA9F-DH21** No sleeve **SA9F-DH22** 3.54" (90mm) sleeve (Both not compatible with green LED)	Heat-resistant glass: Two fibers ø0.7mm (0.03") Threaded mount: ø4mm (M4) Detects: ø0.03mm (0.0012") minimum object	SA1C-FK3 SA1C-FK3G SA1C-F	27mm (1.06") —

Through-Beam Fiber Optic Units - SA9F

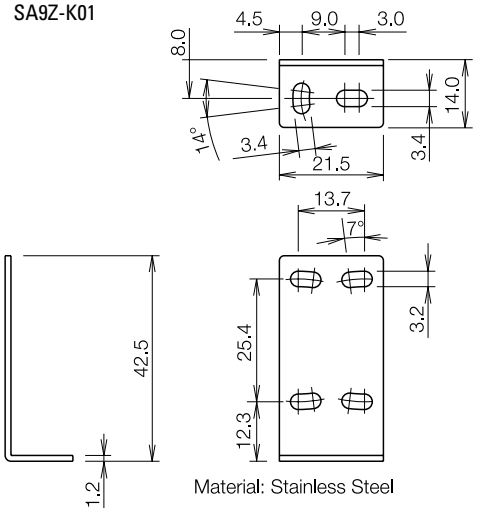
Appearance	Part Number	Description	Amplifier	Range
	**SA9F-TS21** No sleeve **SA9F-TS23** 1.77″ (45mm) sleeve	Straight fiber: ø1mm (0.04″) Threaded mount: ø4mm (M4) Detects: ø0.3mm (0.012″) minimum object	SA1C-FK3 SA1C-FK3G SA1C-F	180mm (7.09″) 16mm (0.63″)
	**SA9F-TC21** No sleeve	Coiled fiber: ø1mm (0.04″) Threaded mount: ø4mm (M4) Detects: ø0.3mm (0.012″) minimum object	SA1C-FK3 SA1C-FK3G SA1C-F	150mm (5.91″) 14mm (0.55″)
	**SA9F-TT11** No sleeve	Straight fiber: ø0.5mm (0.02″) Threaded mount: ø3mm (M3) Detects: ø0.15mm (0.006″) minimum object	SA1C-FK3 SA1C-FK3G SA1C-F	50mm (1.97″) 5mm (0.2″)
	**SA9F-TM21** No sleeve **SA9F-TM22** 3.54″ (90mm) sleeve **SA9F-TM23** 1.77″ (45mm) sleeve 16 fibers (cluster)	Multicore: ø0.26mm (0.010″) Threaded mount: ø4mm (M4) Detects: ø0.3mm (0.012″) minimum object	SA1C-FK3 SA1C-FK3G SA1C-F	150mm (5.91″) 14mm (0.55″)
	**SA9F-TM74** 16 fibers in one row	Multicore: 16 fibers (one row) ø0.26mm (0.010″) Detects: ø0.06mm (0.0024″) minimum object	SA1C-FK3 SA1C-FK3G SA1C-F	150mm (5.91″) 14mm (0.55″)
	**SA9F-TH21** No sleeve **SA9F-TH22** 3.54″ (90mm) sleeve	Heat-resistant glass fiber: ø1mm (0.04″) Threaded mount: ø4mm (M4) Detects: ø0.3mm (0.012″) minimum object	SA1C-FK3 SA1C-FK3G SA1C-F	100mm (3.94″) 8mm (0.31″)

Miscellaneous Accessories

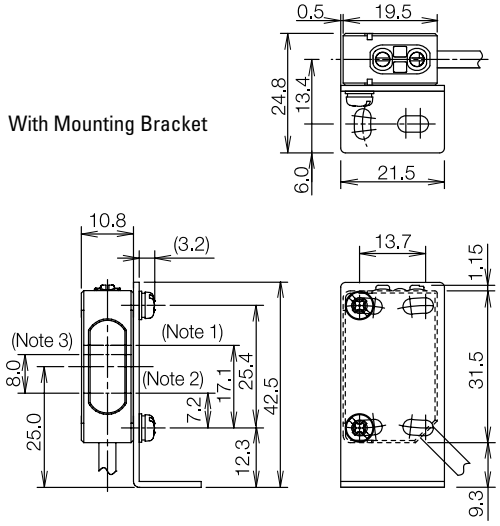
Description	Use with		Part Number
Fiber cutter	All fiber units except heat resistant	HxLxD: 23x 45 x 8mm (0.91" x 1.77" x 0.31") Included with fiber units; order replacement only	SA9Z-F01
Set of 2 easy-insert adaptors	SA9F-TT, SA9F-TL, SA9F-DT, and SA9F-DL	ø2.2 x 24mm long (ø0.087" (OD) x 0.945") Included with applicable fiber optic units; order replacement set only	SA9Z-F02
Lens attachment for long-range detection of opaque objects, minimum size: Ø 0.14" (3.5mm)	SA1C-F through-beam fiber unit only		SA9Z-F11
	Sensing ranges: Standard speed red LED: SA9F-TS21: 1.3m (4' – 3-3/16") SA9F-TC21: 1m (3' – 3-3/8") 0.1m (3.94") SA9F-TM21: 1.05m (3' – 5-3/8")		
	Sensing ranges: Standard speed green LED: SA9F-TS21: 0.135m (5.31") SA9F-TC21: 0.1m (3.94") SA9F-TM21: 0.13m (5.12")		
	Sensing ranges: High-speed red LED: SA9F-TS21: 0.4m (5.75") SA9F-TC21: 0.3m (1.81") SA9F-TM21: 0.38m (4.96")		
Side view attachment to rotate axis by 90° for detection of opaque objects, minimum size: Ø 0.14" (3.5mm)	SA1C-F through-beam fiber unit only		SA9Z-F12
	Sensing ranges: Standard speed red LED: SA9F-TS21: 200mm (7.87") SA9F-TC21: 130mm (5.12") SA9F-TM21: 160mm (6.30")		
	Sensing ranges: High-speed red LED: SA9F-TS21: 50mm (1.97") SA9F-TC21: 35mm (1.38") SA9F-TM21: 40mm (1.57")		
Side-on attachment for narrow clearance, Range: 1.26" (32mm), for detection of transparent or opaque objects	SA1C-F diffuse-reflected light fiber unit only		SA9Z-F13
	Sensing ranges: Standard speed red LED: SA9F-TS21: 35mm (1.38") SA9F-TC21: 30mm (1.81") SA9F-TM21: 35mm (1.38")		
Attachment for high-accuracy: Range: 0.4" ± 0.04" (10mm ± 1mm), for detection of transparent or opaque objects	SA1C-F through-beam fiber unit only		SA9Z-F14
	Sensing ranges: Standard speed red LED:		
	SA9F-TS21: SA9F-TC21: SA9F-TM21:	10mm ± 1mm (0.394" ± 0.039")	

Accessory Dimensions (mm)

Mounting Bracket
SA9Z-K01

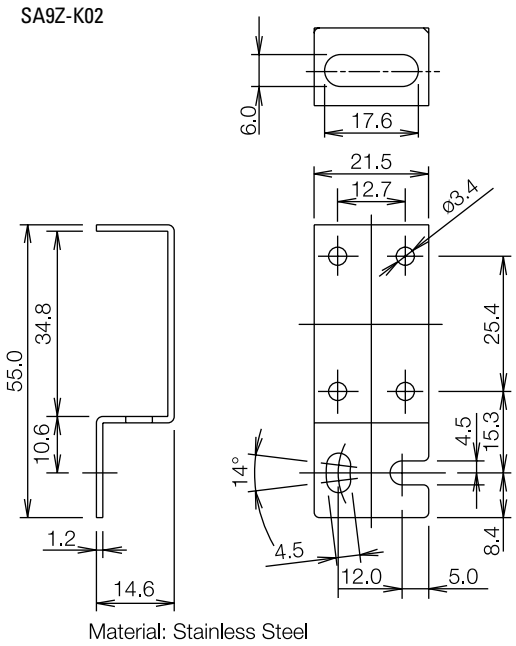


With Mounting Bracket

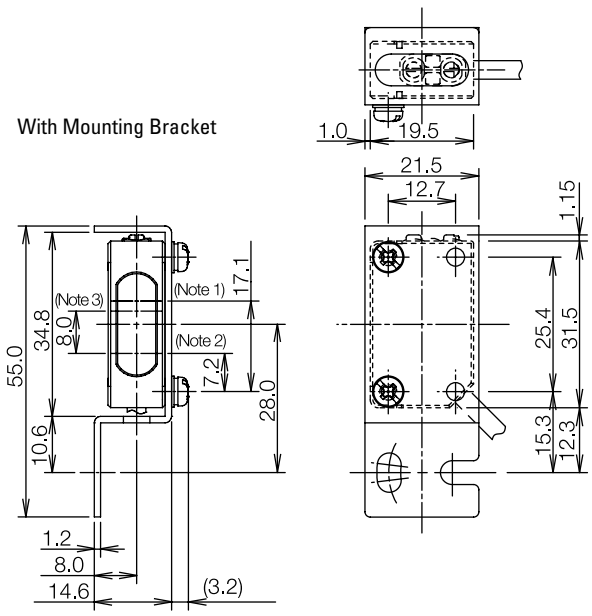


Note 1: Projector (through-beam)Receiver (through-beam)
Note 2: Projector (polarized retroreflective, background suppression)
Note 3: Receiver (polarized retroreflective)

SA9Z-K02

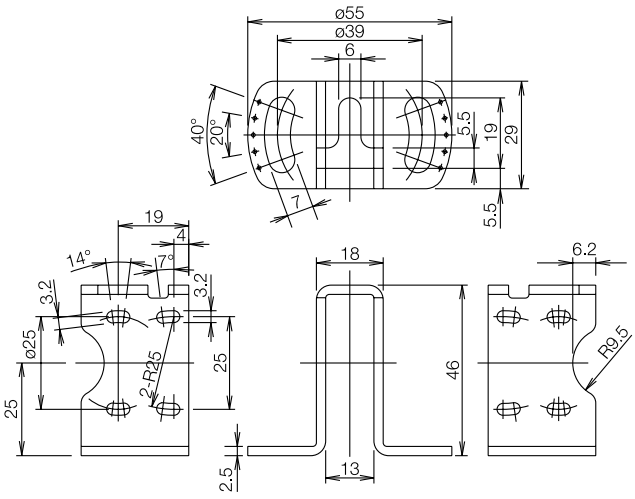


With Mounting Bracket



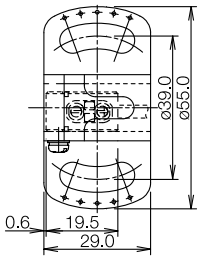
Note 1: Projector (through-beam)Receiver (through-beam)
Note 2: Projector (polarized retroreflective, background suppression)
Note 3: Receiver (polarized retroreflective)

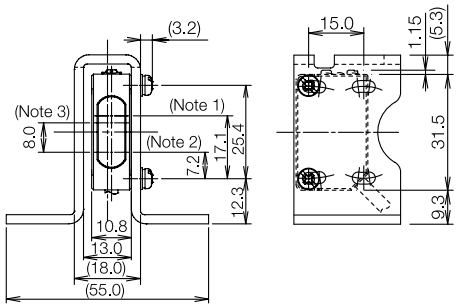
SA9Z-K03



Material: Stainless Steel

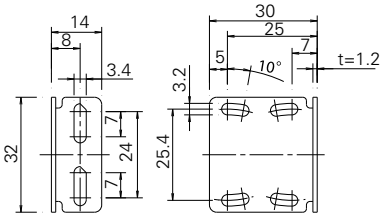
With Mounting Bracket





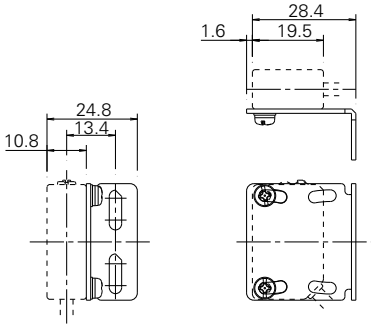
Note 1: Projector (through-beam)Receiver (through-beam)
Note 2: Projector (polarized retroreflective, background suppression)
Note 3: Receiver (polarized retroreflective)

SA9Z-K04

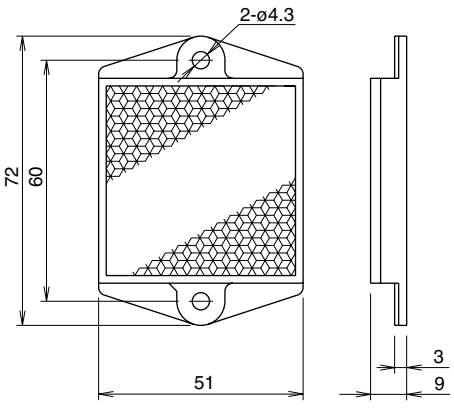


Material: Stainless Steel

With Mounting Bracket

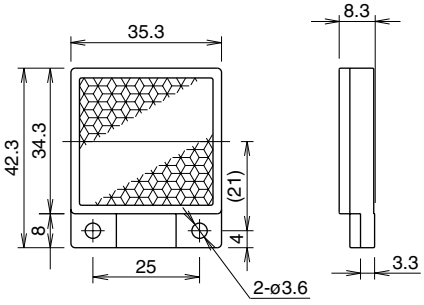


Reflector
IAC-R5



(Effective reflecting area: 47.2 × 47.2)
Material: PMMA (reflector), ABS (base)

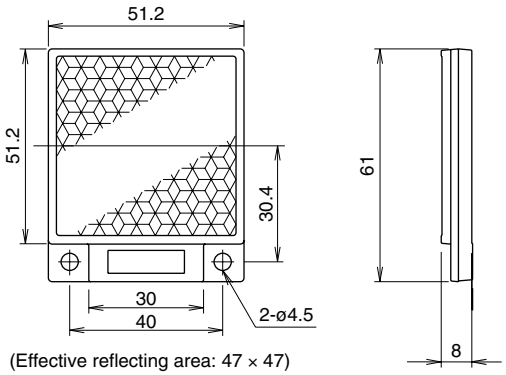
IAC-R6



(Effective reflecting area: 30 × 31)
Material: PMMA (reflector), ABS (base)

Reflector

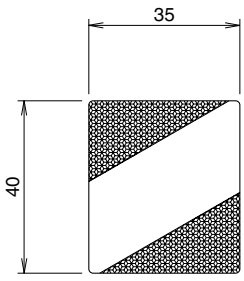
IAC-R8



(Effective reflecting area: 47 × 47)

Material: PMMA (reflector), ABS (base)

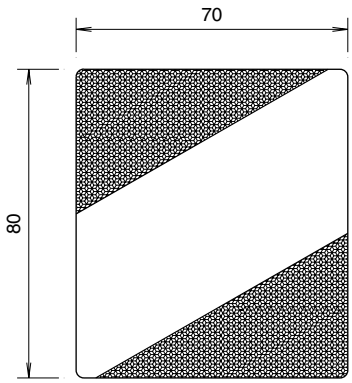
IAC-RS1



Thickness = 0.5 mm

Material: PMMA

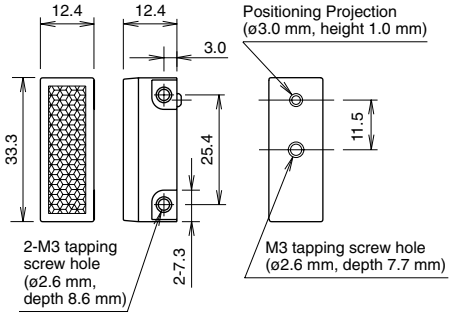
IAC-RS2



Thickness = 0.5 mm

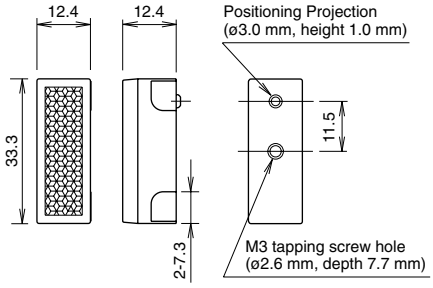
Material: PMMA

IAC-R7M (rear/side mounting)



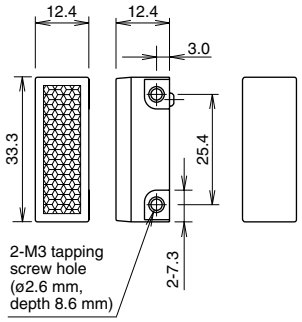
Material: PMMA (reflector), ABS (base)

IAC-R7B (rear mounting)



Material: PMMA (reflector), ABS (base)

IAC-R7S (side mounting)

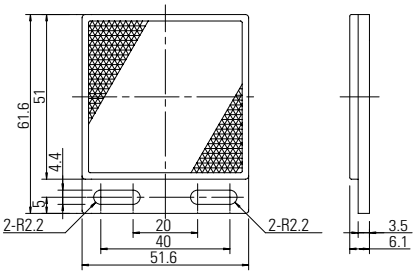


Material: PMMA (reflector), ABS (base)

Effective reflecting area: 8.6 × 29.5

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

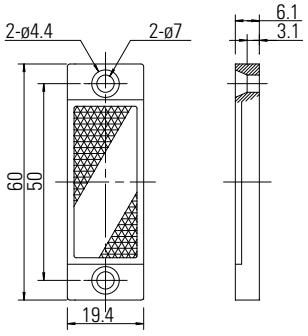
IAC-R9



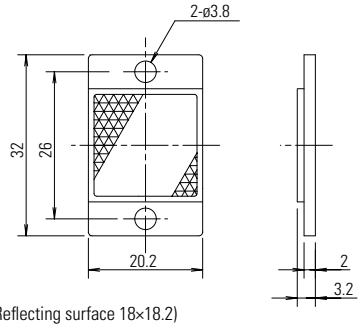
(Reflecting surface 47×47.6)

Material: PMMA (reflector), ABS (base)

IAC-R10



IAC-R11

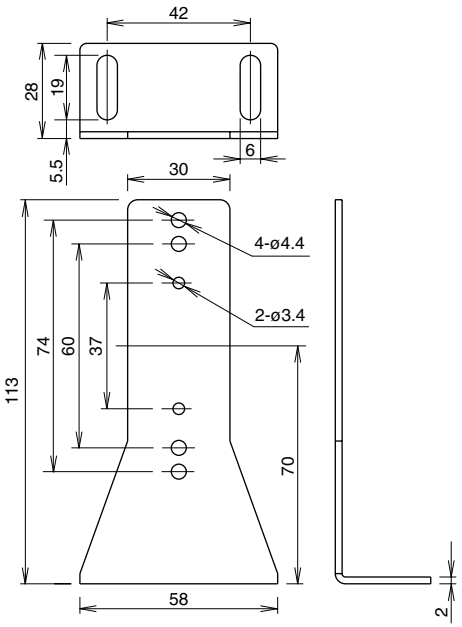


(Reflecting surface 18×18.2)

Material: PMMA (reflector), ABS (base)

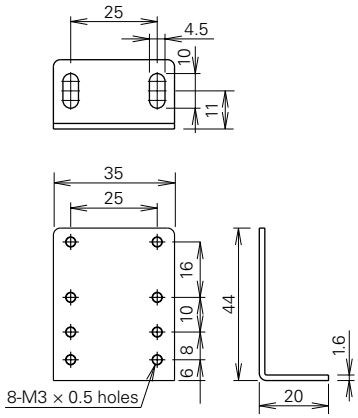
Reflector Mounting Bracket

IAC-L2 (for IAC-R5)



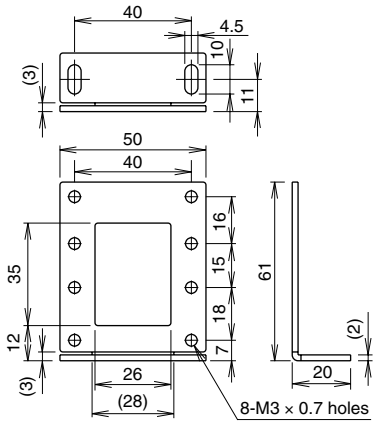
Material: SPCC (zinc chromate plating, black)

IAC-L3 (for IAC-R6)



Material: SPCC (zinc plating)

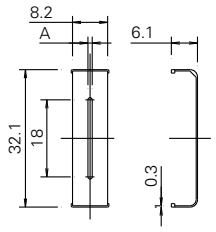
IAC-L5 (for IAC-R8)



Material: SPCC (zinc plating)

Slit (Vertical Slit)

SA9Z0S06, -S07, -S08

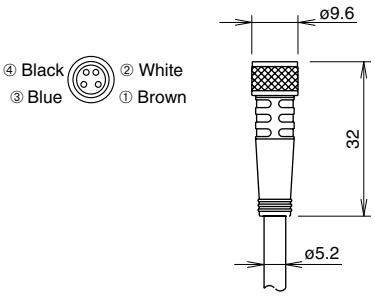


Material: Stainless Steel

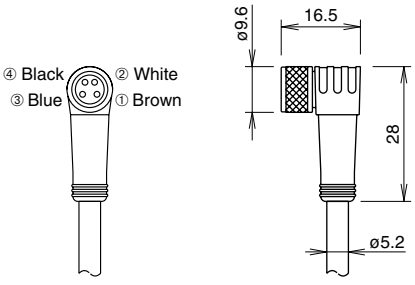
Slit	
Part No.	Slight Width: A
SA9Z-S06	0.5 mm
SA9Z-S07	1.0 mm
SA9Z-S08	2.0 mm

Connector Cable (connector on one end)

Straight (SA9Z-CM8K-4S□)

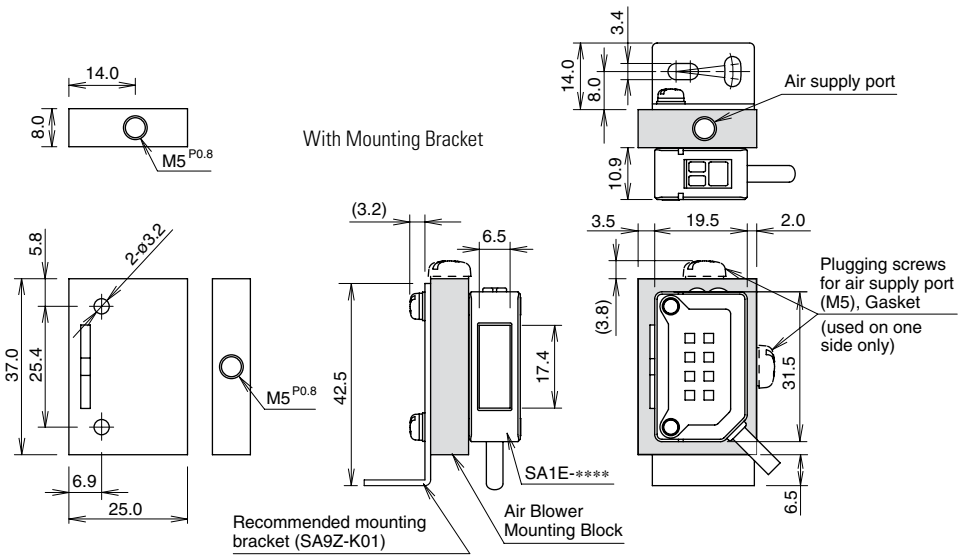


Right-angle (SA9Z-CM8K-4L□)



Dielectric strength when installed on the SA1E: 1000V AC (between live part and mounting bracket, except between live part and tightening ring)

Air Blower Mounting Block

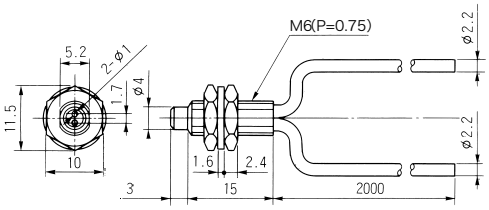


(Material: Anodized aluminum surface)

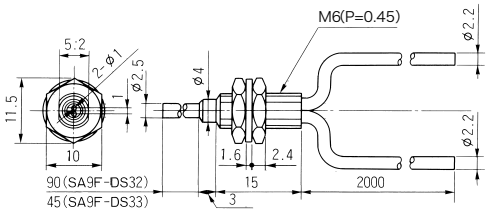
- The SA9Z-A02 air blower mounting block is supplied with two mounting screws (M3 × 20 mm sems screws), one screw for plugging the air supply port (M5 × 6 mm), and one gasket for plugging the air supply port.
- An air tube fitting (M5) can be installed to either the top or side. Tighten the fitting to 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).

Diffuse-Reflective Light Fiber Optic Units

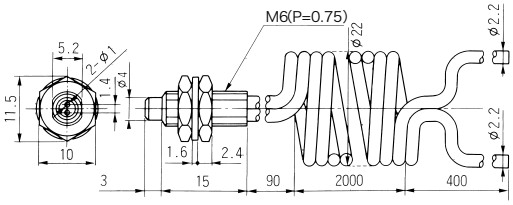
SA9F-DS31



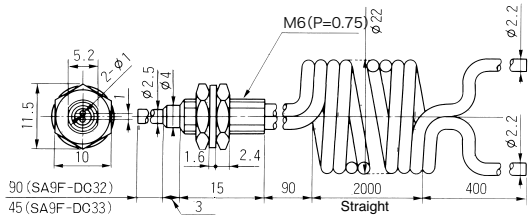
SA9F-DS32, SA9F-DS33



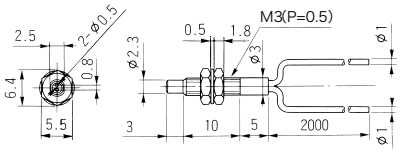
SA9F-DC31



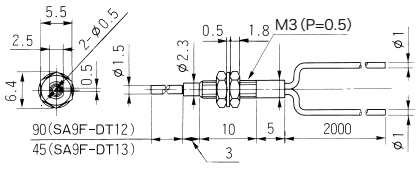
SA9F-DC32, SA9F-DC33



SA9F-DT11



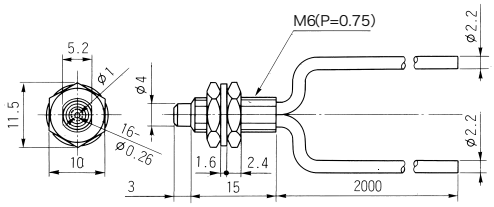
SA9F-DT12, SA9F-DT13



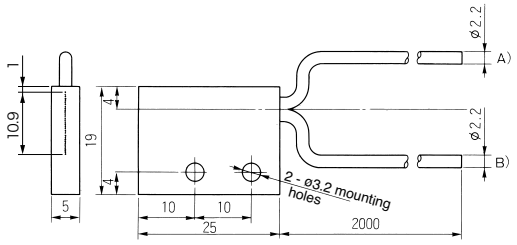
Diffuse-Reflective Light Fiber Optic Units con't

Dimensions (mm)

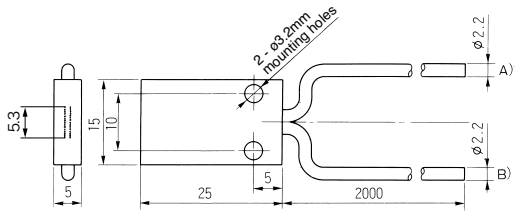
SA9F-DD31



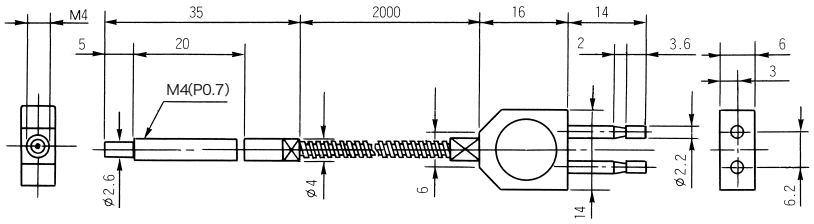
SA9F-DM74



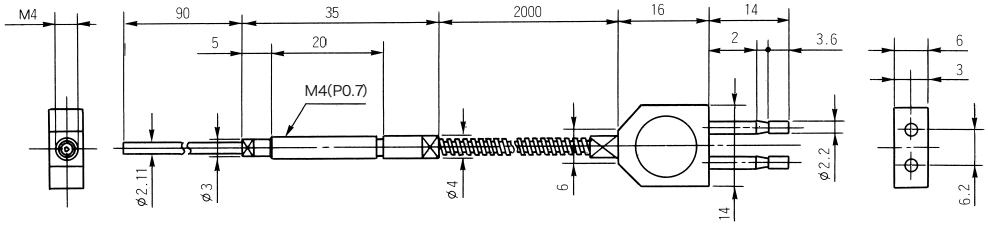
SA9F-DM75



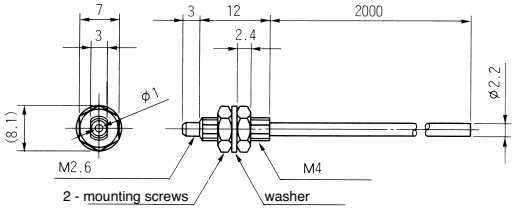
SA9F-DH21



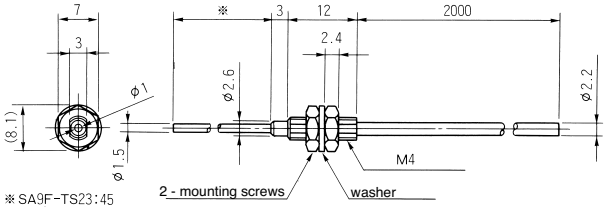
SA9F-DH22



SA9F-TS21



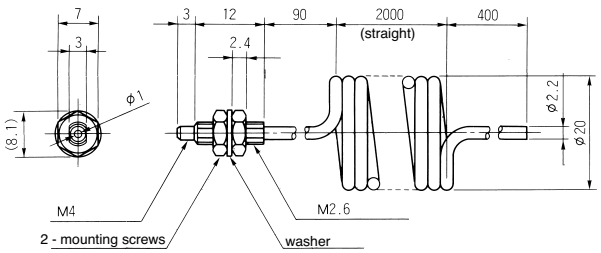
SA9F-TS23



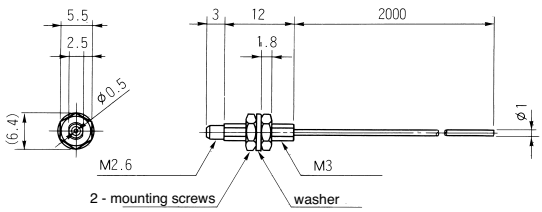
Diffuse-Reflective Light Fiber Optic Units con't

Dimensions (mm)

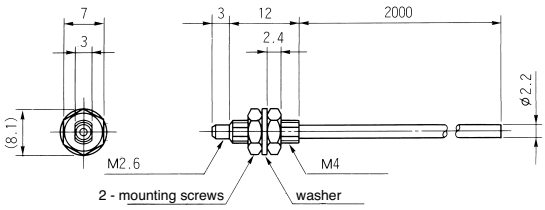
SA9F-TC21



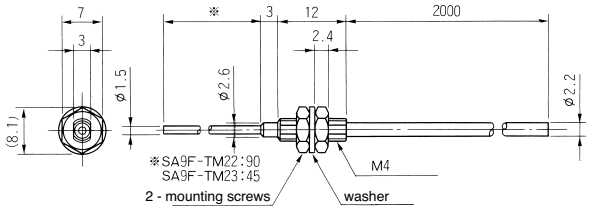
SA9F-TT11



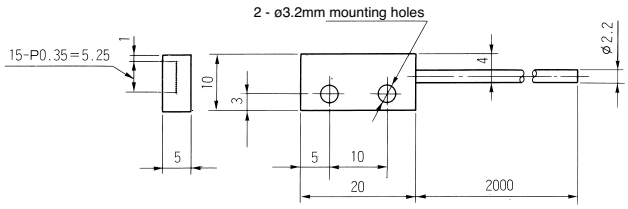
SA9F-TM21



SA9F-TM22, SA9F-TM23



SA9F-TM74



SA9F-TH21