

## INSTRUCTION SHEET

### Laser Sensor SA1E-L Series

Confirm that the delivered product is what you have ordered. Read this instruction sheet to make sure of correct operation. Make sure that the instruction sheet is kept by the end user.

#### SAFETY PRECAUTIONS

In this operation instruction sheet, safety precautions are categorized in order of importance to Caution.

#### CAUTION

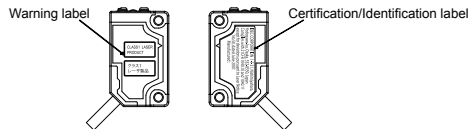
Caution notices are used where inattention might cause personal injury or damage to equipment.

#### 1 For safety use of a laser product

#### CAUTION

- Caution - Use of controls or adjustments or performance of procedures other than those specified in this manual may result in hazardous radiation exposure.
- This product emits a visible laser beam. Do not stare into the beam directly. Furthermore, do not look the laser which is reflected at a mirror-like object.

- About safety standards of laser product, IEC60825-1 "Safety of laser products" has been stipulated by the IEC(International Electrotechnical Commission). This product is classified as "CLASS1 product" according to IEC60825-1.
- This product complies with 21 CFR 1040.10 and 21 CFR 1040.11 according to Laser Notice No.50, dated June 24, 2007, issued by CDRH(Center for Devices and Radiological Health) under FDA(Food and Drug Administration).
- Labels  
Following "Warning label" and "Certification/Identification label" are affixed on this product according to IEC 60825-1 and laser regulation of FDA. When this product will be incorporated into final device system which is exported to the USA, make sure that Certification/Identification label is affixed.

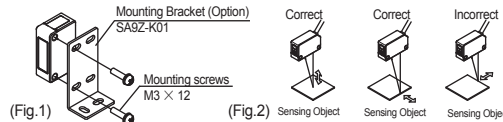


#### 2 Type

- SA1E-□□□□
- T : Through-beam
  - P : Polarized retro-reflective
  - B : Background suppression
  - N : NPN Output
  - P : PNP Output
  - blank : Cable (1m)
  - 2M : Cable (2m)
  - 5M : Cable (5m)
  - C : Connector (M8)
  - 3 : Light ON / Dark ON selectable

#### 3 Installation

- Do not apply excessive impact on the sensor during the installation process, so as to prevent damage or deterioration in the degree of protection.
- To install the sensor, tighten the mounting screws to a torque of 0.5N·m or less. (Fig.1)
- Install the Background suppression type sensor head perpendicular to the object transfer as shown below to minimize sensing errors. (Fig.2)



#### 4 Specifications

Detection System		Through-beam	Polarized retroreflective	Background supression
TYPE No.	NPN Output	SA1E-LTN3	SA1E-LPN3	SA1E-LBN3
	PNP Output	SA1E-LTP3	SA1E-LPP3	SA1E-LBP3
Light Source		Red Laser diode(Emission wavelength: 650nm) IEC/JIS CLASS1 *1 Maximum output: 7mW		
Power Voltage		12 to 24V DC Ripple p-p 10% maximum (Operating range 10 to 30V DC)		
Current Consumption		Emitter : 15mA maximum Receiver : 30mA maximum	35mA maximum	
Sensing Range		30m	0.3 to 10m Reflector : IAC-R5/R8/R9*2	20 to 300mm (White paper 200×200mm) 40 to 300mm
Adjustable setting range		-	-	-
Hysteresis		-	-	10%
Minimum sensing object(typical)		φ6mm opaque object (at 3m)	φ6mm opaque object (at 3m)	φ0.2mm copper wire (at 170mm)
Control Output		Open collector output (NPN / PNP output selectable) Load voltage : 30V DC maximum, Load current : 100mA maximum, Voltage drop : 1.5V maximum Light-ON/Dark-ON switch selectable		
Protection Circuit		Reverse polarity protection, Load short circuit protection	Reverse polarity protection, Load short circuit protection, Interference prevention	
Response Time		250us maximum		
Ambient Temperature*3		Operating : -10 to +55 °C, Storage : -25 to +70 °C (no freezing and condensation)		
Ambient Humidity		Operating : 35 to 85% RH, Storage : 35 to 85% RH (no condensation)		
Degree of protection		IP67 (IEC60529)		
Material		Housing: PBT, Lens: PMMA, Display: PC		
Cable		φ3.5mm, 3-core(2-core for emitter of through-beam type), 0.2mm <sup>2</sup> , 1m/2m/5m cabtyre cable		

- \*1: This product complies with 21CFR 1040.10 and 1040.11 based on Notice No.50.
- \*2: Maintain at least the following distance between the sensor and reflector. IAC-R5/R8/R9 : 300mm
- \*3: Maximum operating temperature is 50°C when using this product as UL/c-UL listed products.

#### 5 Notes for Operation

- Do not use the sensor during the transient time of 100 ms after turning on the power supply.
- If the sensor and the load are connected to different power supplies, the sensor must always be turned on first.
- Do not install the sensor outdoors, nearby induction device, or heat source. Choose locations free from frequent vibrations, shocks, dust, toxic gases, water, oil, and chemicals, so as to prevent malfunctions and damage.
- Do not expose the sensor to sunlight or other direct light projections.
- Do not use the sensor with drops of water remaining on the lens or aperture of slits.
- In case installing the reflector of polarized retro-reflective type, make fine adjustment of angle or position of the sensor or reflector.
- This product emits high directional beam. Therefore the beam possibly be out of alignment by the mounting condition. Make sure to adjust the beam axes alignment before use.

#### CAUTION

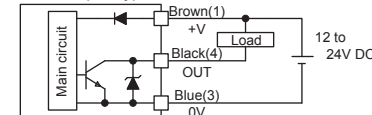
- Do not connect the sensor to AC power supply, so as to prevent explosion and burning.

#### 6 Wiring

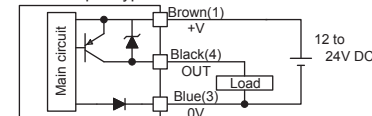
- Turn off the power supply before wiring.
- Connect correctly to prevent damage.
- The power voltage must not exceed the rated range.
- When using a switching power supply, be sure to ground the FG (frame ground) terminal.
- Do not install the sensor wiring in the same conduit with high-voltage lines and power lines.
- Cable extension is allowed up to 100m using a cabtyre cable with core wires of 0.3 mm<sup>2</sup> or more.
- To connect the sensor with connector cable, tighten connector to a torque of 0.5N·m or less.
- Use a UL Listed (CYJV/CYJV7) mating connector/cord assembly when using connector type as UL/c-UL listed products.

#### WIRING DIAGRAM

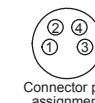
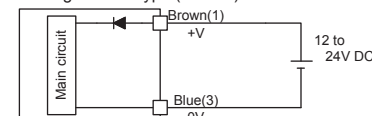
##### NPN Output Type



##### PNP Output Type



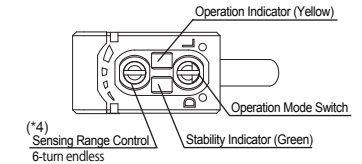
##### Through-beam Type (Emitter)



#### 7 Adjustment for Background suppression type

Step	Distance Control	Adjusting Procedure
1		Install a photoelectric sensor and the sensing object. Turn the control counter-clockwise until the operation LED turns OFF (*1). Then turn clockwise until the operation LED turns ON (point A).
2		Remove the sensing object, then the operation LED turns OFF. Turn clockwise until the operation LED turns ON (The background is detected) (point B). (*2)
3		Set the middle point between point A and B as point C. (*3)

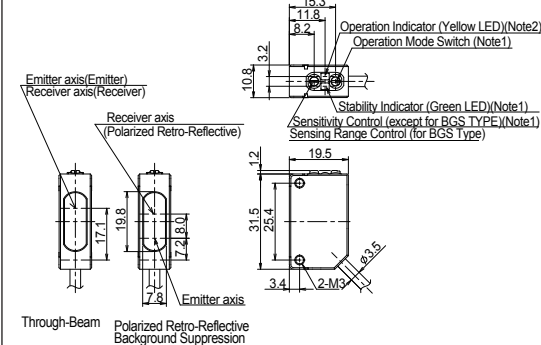
- \*1: If the operation LED turned off, turn on by turning the control clockwise.
- \*2: Make one turn or more clockwise from point A and set the position as point C when the background is too far and the operation LED dose turn ON.
- \*3: There may be more than 1 turn between points A and B, since this photoelectric sensor incorporates a 6-turn adjuster.



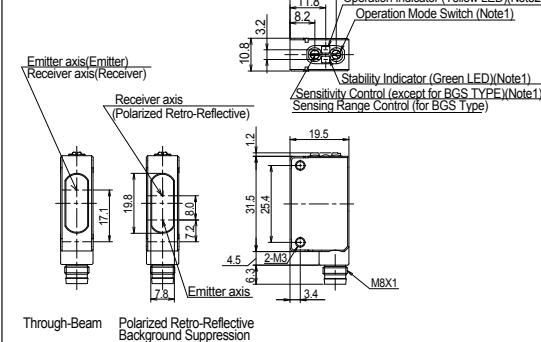
- \*4: Sensing range becomes longer when turned clockwise.

#### 8 Dimensions

##### CABLE TYPE



##### CONNECTOR TYPE



- Note1: Stability Indicator and Sensitivity Control and Operation Mode Switch are not attached to the Emitter of Through-Beam Type.
- Note2: Power Indicator (Green LED) is attached to the Emitter of Through-Beam Type instead of Operation Indicator.