SUNX

INSTRUCTION MANUAL

Ultra-slim Type Photoelectric Sensor **Amplifier Built-in**

EX-10 Series

Thank you very much for using SUNX sensors. Please read this Instruction Manual carefully and thoroughly for the correct and optimum use of this sensor. Kindly keep this manual in a convenient place for quick reference.

⚠ This product is not a safety sensor. Its use is not intended or designed to protect life and prevent body injury or property damage from dangerous parts of machinery. It is a normal object detection sensor.

1 SPECIFICATIONS

Item \ Type	Thru-beam					Convergent reflective
	Front sensing	Side sensing	Front sensing	Side sensing	Front sensing	Front sensing
Model No. (Note 1) Light-ON	**EX-11A(-PN/-R)**	**EX-11EA(-PN/-R)**	**EX-13A(-PN/-R)**	**EX-13EA(-PN/-R)**	**EX-19A(-PN/-R)**	**EX-14A(-PN/-R)**
Model No. (Note 1) Dark-ON	**EX-11B(-PN/-R)**	**EX-11EB(-PN/-R)**	**EX-13B(-PN/-R)**	**EX-13EB(-PN/-R)**	**EX-19B(-PN/-R)**	**EX-14B(-PN/-R)**
Sensing range	150mm		500mm		1m	2 to 25mm (Note 2) (Conv. point: 10mm)
Min. sensing object	ϕ1mm opaque object (Setting distance between emitter and receiver: 150mm)		ϕ2mm opaque object (Setting distance between emitter and receiver: 500mm)		ϕ2mm opaque object (Setting distance between emitter and receiver: 1m)	ϕ0.1mm copper wire (Setting distance: 10mm)
Hysteresis	———					15% or less of operation distance
Repeatability (Perpendicular to sensing axis)	0.05mm or less					0.1mm or less
Supply voltage	12 to 24V DC±10% Ripple P-P10% or less					
Current consumption	Emitter: 10mA or less, Receiver: 15mA or less					20mA or less
Output	〈**EX-□A(-R)** and **EX-□B(-R)**〉 NPN open-collector transistor · Maximum sink current: 50mA · Applied voltage: 30V DC or less (between output and 0V) · Residual voltage: 1V or less (at 50mA sink current) 0.4V or less (at 16mA sink current)				〈**EX-□A-PN** and **EX-□B-PN**〉 PNP open-collector transistor · Maximum source current: 50mA · Applied voltage: 30V DC or less (between output and +V) · Residual voltage: 1V or less (at 50mA source current) 0.4V or less (at 16mA source current)	
Short-circuit protection	Incorporated					
Response time	0.5ms or less					
Operation indicator	Red LED (lights up when the output is ON), located on the receiver for the thru-beam type sensor					
Stability indicator	Green LED (lights up under stable light received condition or stable dark condition), located on the receiver for the thru-beam type sensor					
Protection	IP67 (IEC)					
Ambient temperature	−25 to +55°C (Note 3) (No dew condensation or icing allowed), Storage: −30 to +70°C					
Ambient humidity	35 to 85% RH, Storage: 35 to 85% RH					
Emitting element	Red LED (modulated)					
Material	Enclosure: Polyethylene terephthalate, Lens: Polyalylate					
Cable	0.1mm² 3-core (thru-beam type emitter: 2-core) cabtyre cable, 2m long (Note 4)					
Weight	Emitter, receiver: 20g approx. each					20g approx.
Accessories	Mounting screws: 2 sets					Mounting screws: 1 set

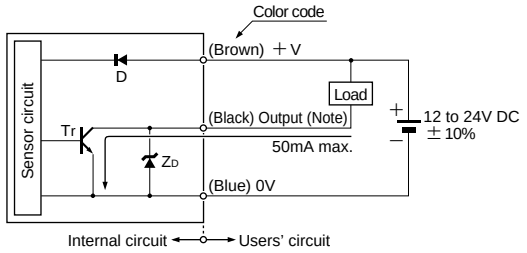
Notes: 1) Model Nos. having the suffix '**-PN**' are PNP output type. Further, model Nos. having suffix '**-R**' are inflection resistant cable type. (NPN output type only)
2) The sensing range of the convergent reflective type sensor is specified for white non-glossy paper (50×50mm) as the object.
3) −10 to +55°C for the inflection resistant cable type.
4) The inflection resistant type has a 0.1mm² 3-core (thru-beam type emmitter: 2-core) inflection resistant cabtyre cable, 2m long.

2 CAUTIONS

- For the convergent reflective type **EX-14**□, if there is a reflective object (e.g., a conveyor, etc.) in the background of the sensing object, since it may affect the sensing, use by keeping enough distance from the reflective object.
- Make sure to carry out wiring in the power supply off condition.
- Take care that wrong wiring will damage the sensor.
- Verify that the supply voltage variation is within the rating.
- If power is supplied from a commercial switching regulator, ensure that the frame ground (F.G.) terminal of the power supply is connected to an actual ground.
- In case noise generating equipment (switching regulator, inverter motor, etc.) is used in the vicinity of the product, connect the frame ground (F.G.) terminal of the equipment to an actual ground.
- Do not use during the initial transient time (50ms) after the power supply is switched on.
- Extension up to total 50m is possible with a 0.3mm², or more, cable for, both, emitter and receiver.
- Do not run the wires together with high-voltage lines or power lines or put them in the same raceway. This can cause a malfunction due to induction.
- Take care that the sensor is not directly exposed to fluorescent light from a rapid-starter lamp or a high frequency lighting device, as it may affect the sensing performance.
- Avoid dust, dirt, and steam.
- Take care that the sensor does not come in direct contact with water, oil, grease or organic solvents, such as, thinner, etc.
- This sensor is suitable for indoor use only.
- Make sure that stress is not applied directly to the sensor cable joint.

3 I/O CIRCUIT DIAGRAMS

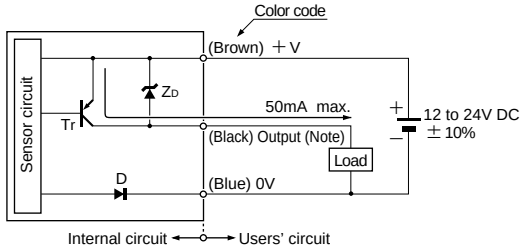
● **EX-□A(-R), EX-□B(-R)** /NPN output type



Note: The emitter of the thru-beam type sensor does not incorporate the output.

Symbols . . . D : Reverse supply polarity protection diode
ZD: Surge absorption zener diode
Tr : NPN output transistor

● **EX-□A-PN, EX-□B-PN**/PNP output type



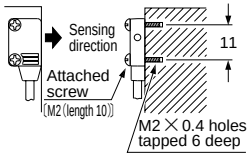
Note: The emitter of the thru-beam type sensor does not incorporate the output.

Symbols . . . D : Reverse supply polarity protection diode
ZD: Surge absorption zener diode
Tr : PNP output transistor

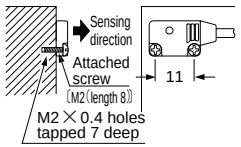
4 MOUNTING

● **In case of mounting on tapped holes (Unit: mm)**

Side sensing



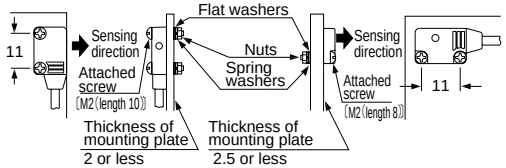
Front sensing



The tightening torque should be 0.2N·m or less.

● **In case of using attached screws and nuts (Unit: mm)**

Side sensing



Front sensing

The tightening torque should be 0.2N·m or less.

5 OPTIONAL SENSOR MOUNTING BRACKET

- When mounting the sensor with the optional sensor mounting bracket, use the attached M2 screws and the tightening torque should be 0.2N·m or less.
- Six types of optional sensor mounting brackets are available.

Model No.	Description	Material
MS-EX10-1	Mounting bracket for front sensing type only Two M2 (length 4mm) pan head screws are attached.	Cold rolled carbon steel (SPCC)
MS-EX10-2	Mounting bracket for side sensing type only Two M2 (length 8mm) pan head screws are attached.	
MS-EX10-3	L-shaped mounting bracket Two M2 (length 4mm) pan head screws, and two M2 (length 8mm) pan head screws are attached.	
MS-EX10-11	Mounting bracket for front sensing type only Two M2 (length 4mm) pan head screws (stainless steel) are attached.	Stainless steel (SUS304)
MS-EX10-12	Mounting bracket for side sensing type only Two M2 (length 8mm) pan head screws (stainless steel) are attached.	
MS-EX10-13	L-shaped mounting bracket Two M2 (length 4mm) pan head screws (stainless steel), and two M2 (length 8mm) pan head screws (stainless steel) are attached.	

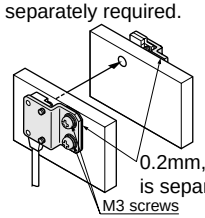
6 OPTIONAL SLIT MASK (EX-13□ and EX-19□ only)

- Apply a slit mask when detecting small objects or for increasing the accuracy of sensing position. However, the sensing range is reduced when the slit mask is mounted.

Model No.	Description	Material
OS-EX10-12	Slit mask for front sensing type only (hole diameter: ϕ1.2mm)	Stainless steel (SUS304)
OS-EX10-15	Slit mask for front sensing type only (hole diameter: ϕ1.5mm)	
OS-EX10E-12 (Note)	Slit mask for side sensing type only (hole diameter: ϕ1.2mm)	

Note: Excluding **EX-19**□.

- The slit mask should be mounted on the sensor before mounting the sensor.
- If the front sensing type sensor is used along with the slit mask and the optional sensor mounting bracket for the front sensing type, **MS-EX10-1** or **MS-EX10-11**, as shown in the figure below, a 0.2mm, or more, thick spacer is separately required.



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