

# 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	<b>EX-11A(-PN/-R)</b>	<b>EX-11EA(-PN/-R)</b>	<b>EX-13A(-PN/-R)</b>	<b>EX-13EA(-PN/-R)</b>	<b>EX-19A(-PN/-R)</b>	<b>EX-14A(-PN/-R)</b>
	Dark-ON	<b>EX-11B(-PN/-R)</b>	<b>EX-11EB(-PN/-R)</b>	<b>EX-13B(-PN/-R)</b>	<b>EX-13EB(-PN/-R)</b>	<b>EX-19B(-PN/-R)</b>	<b>EX-14B(-PN/-R)</b>
Sensing range		150mm		500mm		1m	
Min. sensing object		φ1mm opaque object (Setting distance between emitter and receiver: 150mm)		φ2mm opaque object (Setting distance between emitter and receiver: 500mm)		φ0.1mm copper wire (Setting distance between emitter and receiver: 1m)	
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%					
Current consumption		Emitter: 10mA or less, Receiver: 15mA or less				20mA or less	
Output		<b>&lt;EX-□A(-R) and EX-□B(-R)&gt;</b> 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)		<b>&lt;EX-□A-PN and EX-□B-PN&gt;</b> 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: Polyallylate					
Cable		0.1mm <sup>2</sup> 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 0.1mm<sup>2</sup> 3-core (thru-beam type emitter: 2-core) inflection resistant cabtyre cable, 2m long.

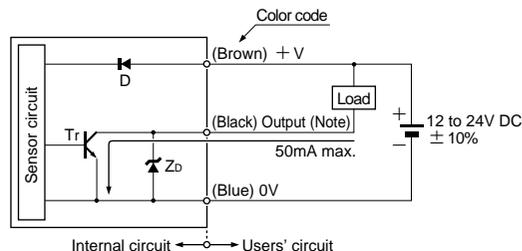
## 2 CAUTIONS

- 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 0.3mm<sup>2</sup>, 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

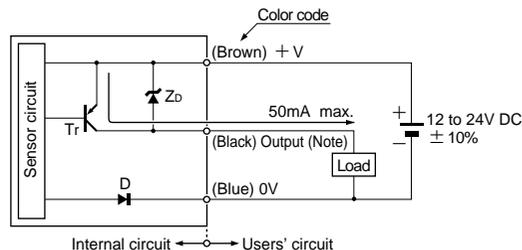
- **EX-□A(-R), EX-□B(-R) /NPN output type**



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

Symbols . . . D : Reverse supply polarity protection diode  
 Z<sub>b</sub>: Surge absorption zener diode  
 Tr : NPN output transistor

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

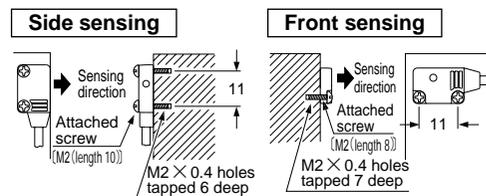


Note: The emitter of the thru-beam type sensor does not incorporate the output.

Symbols . . . D : Reverse supply polarity protection diode  
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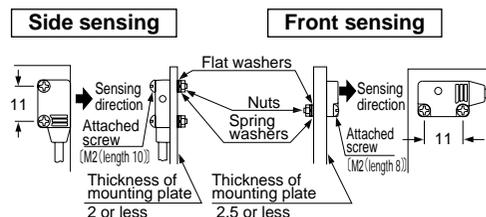
## 4 MOUNTING

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



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

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



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
<b>MS-EX10-1</b>	Mounting bracket for front sensing type only Two M2 (length 4mm) pan head screws are attached.	Cold rolled carbon steel (SPCC)
<b>MS-EX10-2</b>	Mounting bracket for side sensing type only Two M2 (length 8mm) pan head screws are attached.	
<b>MS-EX10-3</b>	L-shaped mounting bracket Two M2 (length 4mm) pan head screws, and two M2 (length 8mm) pan head screws are attached.	Stainless steel (SUS304)
<b>MS-EX10-11</b>	Mounting bracket for front sensing type only Two M2 (length 4mm) pan head screws (stainless steel) are attached.	
<b>MS-EX10-12</b>	Mounting bracket for side sensing type only Two M2 (length 8mm) pan head screws (stainless steel) are attached.	
<b>MS-EX10-13</b>	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.	

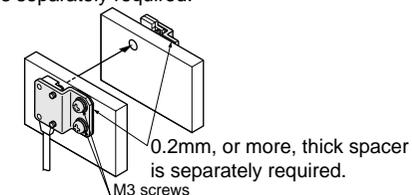
## 6 OPTIONAL SLIT MASK (EX-13□ and EX-19□ only)

- 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
<b>OS-EX10-12</b>	Slit mask for front sensing type only (hole diameter: φ1.2mm)	Stainless steel (SUS304)
<b>OS-EX10-15</b>	Slit mask for front sensing type only (hole diameter: φ1.5mm)	
<b>OS-EX10E-12 (Note)</b>	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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