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## Ultra-compact Photoelectric Sensor

The EX-20 series reaches the pinnacle of sensor miniaturization. By fabricating the photodiode and the A/D conversion circuit on the same chip, SUNX has achieved one of the smallest built-in amplifier sensors in the world. With integrated sensitivity adjustment, the

EX-20 series is great for use as an all-purpose sensor. Even though the sensor is extremely small, the sensing distance is not compromised. Up to a 2m detection distance is possible with the thru-beam type, 200mm with the retro-reflective type, and 160mm for the diffuse reflective type. A visible red beam spot allows for easy confirmation of alignment. Also, the LED used in the EX-20 series provides a high-power, narrow beam that can produce a spot as small as 1mm in diameter. This is great for the detection of small objects such as chip components or wires.

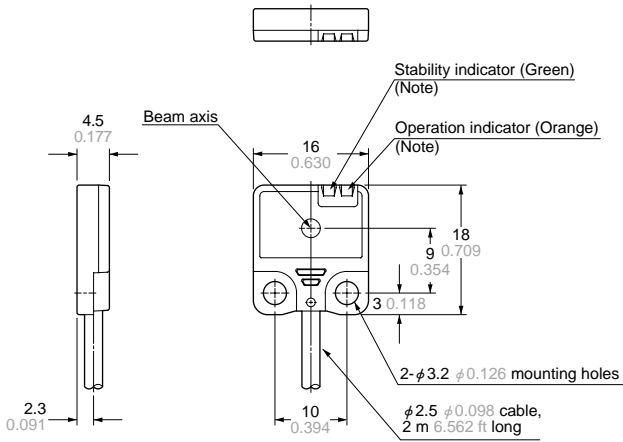
The mounting options available include a front sensing type as well as a side sensing type. Each type has two, metal reinforced M3 mounting holes for stable sensor placement. All types are available as either Light ON or Dark ON and PNP or NPN.

Model Name	Model Pic	Type	Output Operation	Output Configuration	Emitting Element	Max. Range (mm)	Max. Range (in)
Sort ▲ ▼		Sort ▲ ▼	Sort ▲ ▼	Sort ▲ ▼	Sort ▲ ▼	Sort ▲ ▼	Sort ▲ ▼
EX-21A		Thru-beam Front Sensing	Light-ON	NPN	Red LED	1000	39.4
EX-21B		Thru-beam Front Sensing	Dark-ON	NPN	Red LED	1000	39.4
EX-22A		Diffuse Reflective Side Sensing	Light-ON	NPN	Red LED	160	6.3
EX-22B		Diffuse Reflective Side Sensing	Dark-ON	NPN	Red LED	160	6.3
EX-23		Thru-beam Side Sensing	Light-ON/Dark-ON	NPN	Red LED	2000	78.7
EX-24A		Convergent Reflective Front Sensing	Light-ON	NPN	Red LED	25	0.98
EX-24B		Convergent Reflective Front Sensing	Dark-ON	NPN	Red LED	25	0.98
EX-26A		Convergent Reflective Side Sensing	Light-ON	NPN	Red LED	14	0.55

# EX-20

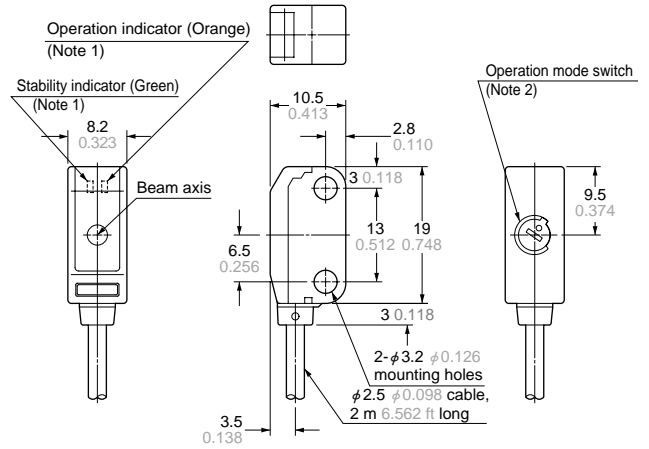
## DIMENSIONS (Unit: mm in)

### EX-21 Sensor



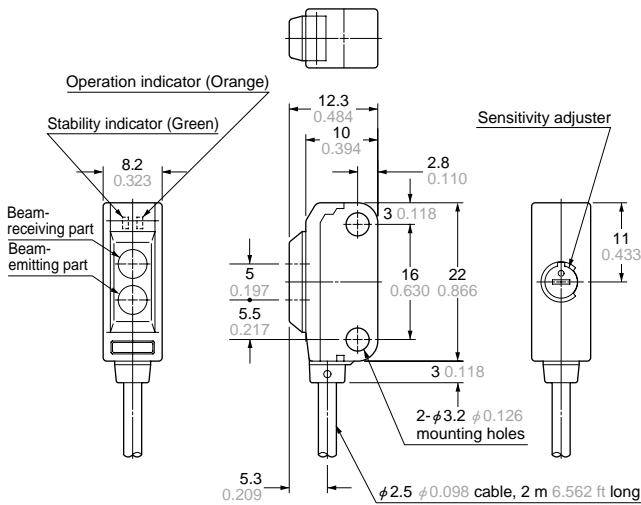
Note: Not incorporated on the emitter.

### EX-23 Sensor

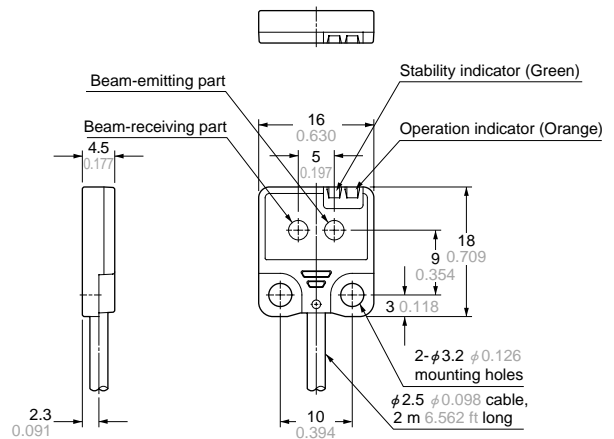


Notes: 1) Not incorporated on the emitter.  
2) It is the sensitivity adjuster on the emitter.

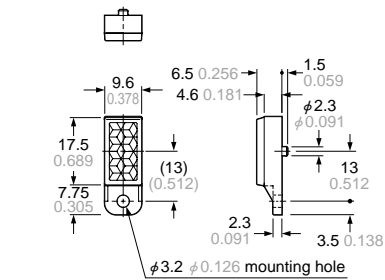
### EX-29 EX-22 EX-26 EX-28 Sensor



### EX-24 Sensor

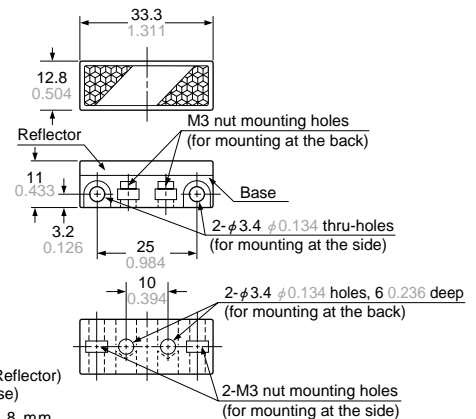


### RF-200 Reflector (Accessory for the retroreflective type sensor)



Material: Acrylic (Reflector)  
ABS (Base)

### RF-210 Reflector (Optional)



Material: Acrylic (Reflector)  
ABS (Base)  
Two M3 (length 8 mm 0.315 in) screws with washers and two nuts are attached.

## SPECIFICATIONS

Item	Model No. (Note 1)	Type	Thru-beam		Retroreflective	Diffuse reflective	Convergent reflective		Narrow-view reflective
			Front sensing	Side sensing	Side sensing	Side sensing	Diffused beam type	Small spot beam type	Long distance spot beam type
			Light-ON	EX-21A(-PN)	EX-23(-PN)	EX-29A(-PN)	EX-22A(-PN)	EX-24A(-PN)	EX-26A(-PN)
Dark-ON	EX-21B(-PN)	(Note 2)	EX-29B(-PN)	EX-22B(-PN)	EX-24B(-PN)	EX-26B(-PN)	EX-28B(-PN)		
Sensing range			1 m 3.281 ft	2 m 6.562 ft	30 to 200 mm 1.181 to 7.874 in (Note 3)	5 to 160 mm 0.197 to 6.299 in (Note 4) with white non-glossy paper (200 X 200 mm) (7.874 X 7.874 in)	2 to 25 mm 0.079 to 0.984 in (Conv. point: 10 mm 0.394 in) with white non-glossy paper (50 X 50 mm) (1.969 X 1.969 in)	6 to 14 mm 0.236 to 0.551 in (Conv. point: 10 mm 0.394 in) with white non-glossy paper (50 X 50 mm 1.969 X 1.969 in), spot diameter $\phi$ 1 mm $\phi$ 0.039 in with setting distance 10 mm 0.394 in	45 to 115 mm 1.772 to 4.528 in with white non-glossy paper (100 X 100 mm 3.937 X 3.937 in), spot diameter $\phi$ 5 mm $\phi$ 0.197 in with setting distance 80 mm 3.150 in
Sensing object			Min. $\phi$ 2.6 mm $\phi$ 0.102 in opaque object (Setting distance between emitter and receiver: 1 m 3.281 ft)	Min. $\phi$ 3 mm $\phi$ 0.118 in opaque object (Setting distance between emitter and receiver: 2 m 6.562 ft)	$\phi$ 15 mm $\phi$ 0.591 in or more opaque or translucent object (Note 3)	Opaque, translucent or transparent object	Min. $\phi$ 0.1 mm $\phi$ 0.004 in copper wire (Setting distance: 10 mm 0.394 in)	Min. $\phi$ 0.1 mm $\phi$ 0.004 in copper wire (Setting distance: 10 mm 0.394 in)	Opaque, translucent or transparent object (Min. $\phi$ 1 mm $\phi$ 0.039 in copper wire at setting distance 80 mm 3.150 in)
Hysteresis			—			15 % or less of operation distance			
Repeatability (perpendicular to sensing axis)			0.05 mm 0.002 in or less		0.5 mm 0.020 in or less	0.3 mm 0.012 in or less	0.1 mm 0.004 in or less (Setting distance: 10 mm 0.394 in)	0.05 mm 0.002 in or less (Setting distance: 10 mm 0.394 in)	0.3 mm 0.012 in or less
Supply voltage			12 to 24 V DC $\pm$ 10 % Ripple P-P 10 % or less						
Current consumption			Emitter: 10 mA or less, Receiver: 15 mA or less		20 mA or less				
Output			<NPN output type> NPN open-collector transistor • Maximum sink current: 50 mA • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 1 V or less (at 50 mA sink current) 0.4 V or less (at 16 mA sink current)			<PNP output type> PNP open-collector transistor • Maximum source current: 50 mA • Applied voltage: 30 V DC or less (between output and + V) • Residual voltage: 1 V or less (at 50 mA source current) 0.4 V or less (at 16 mA source current)			
Utilization category			DC-12 or DC-13						
Short-circuit protection			Incorporated						
Response time			0.5 ms or less						
Operation indicator			Orange LED (lights up when the output is ON) (thru-beam type: located on the receiver)						
Stability indicator			Green LED (lights up under stable light received condition or stable dark condition), located on the receiver		Green LED (lights up under stable light received condition or stable dark condition)				
Sensitivity adjuster			—	Continuously variable adjuster, located on the emitter	Continuously variable adjuster	—	Continuously variable adjuster		
Operation mode switch			—	Located on the receiver	—				
Environmental resistance	Pollution degree		3 (Industrial environment)						
	Protection		IP67 (IEC)						
	Ambient temperature		- 25 to + 55 °C - 13 to + 131 °F (No dew condensation or icing allowed), Storage: - 30 to + 70 °C - 22 to + 158 °F						
	Ambient humidity		35 to 85 % RH, Storage: 35 to 85 % RH						
	Ambient illuminance		Sunlight: 10,000 lx at the light-receiving face, Incandescent light: 3,000 lx at the light-receiving face						
	EMC		EN 50081-2, EN 50082-2, EN 60947-5-2						
	Voltage withstandability		1,000 V AC for one min. between all supply terminals connected together and enclosure						
	Insulation resistance		20 M $\Omega$ , or more, with 250 V DC megger between all supply terminals connected together and enclosure						
Vibration resistance		10 to 500 Hz frequency, 3 mm 0.118 in amplitude (20 G max.) in X, Y and Z directions for two hours each							
Shock resistance		500 m/s <sup>2</sup> acceleration (50 G approx.) in X, Y and Z directions for three times each							
Emitting element			Red LED (modulated)						
Material			Enclosure: Polyethylene terephthalate, Lens: Polyacrylate						
Cable			0.1 mm <sup>2</sup> 3-core (thru-beam type sensor emitter: 2-core) cabtyre cable, 2 m 6.562 ft long						
Cable extension			Extension up to total 50 m 164.042 ft is possible with 0.3 mm <sup>2</sup> , or more, cable (thru-beam type: both emitter and receiver).						
Weight			Emitter: 20 g approx., Receiver: 20 g approx.		20 g approx.				
Accessories			—	Adjusting screwdriver: 1 pc.	RF-200 (Reflector): 1 pc. Adjusting screwdriver: 1 pc.	Adjusting screwdriver: 1 pc.	—	Adjusting screwdriver: 1 pc.	

Notes: 1) Model Nos. having the suffix '-PN' are PNP output type.

2) Either Light-ON or Dark-ON can be selected by the operation mode switch (located on the receiver).

3) The sensing range and the sensing object of the retroreflective type sensor are specified for the RF-200 reflector. Further, the sensing range is the possible setting range for the reflector. The sensor can detect an object less than 30 mm 1.181 in away. However, if the reflector is set 100 mm 3.937 in or less away, the sensing object should be opaque.

4) In case of using this product at a sensing range of 50 mm 1.969 in or less, take care that the sensitivity adjustment range becomes extremely narrow.

