

LASER PHOTOELECTRIC SWITCH

# E3L

*Extremely thin beam ensures sharp sensing*

- 2-m Long-Distance Sensing of Objects as Small as 0.85 mm in diameter.
- Spot light can be checked 2 m ahead and adjustment is easy. (E3L-2RC4)



## Ordering Information

### Sensors

Red light  Infrared light

Sensor type	Shape	Sensing distance	Model
Through-beam		<span style="display:inline-block; width:40px; height:10px; background-color: #FF69B4; border: 1px solid black;"></span> 2m <sup>*1</sup>	E3L-2RC4
Diffuse-reflective		<span style="display:inline-block; width:40px; height:10px; background-color: #FFDAB9; border: 1px solid black;"></span> 500mm[200mm] <sup>*2</sup>	E3L-DS5OE4

\*1. The value assumes that a 0.85-mm dia. slit is used. The value is 10 m when no slit is used.

\*2. Values in parentheses indicate the minimum required distance between the sensor and reflector.

Slit (Accessory)	Sensing distance	Sensing object	Remarks
When 0.1-mm dia. slit is fitted	300 mm	Opaque 0.1 dia. min.	Attached to the through-beam E3L-2RC4. Fit the slit to the receiver.
When 0.5-mm dia. slit is fitted	1 m	Opaque 0.5 dia. min.	
When 0.85-mm dia. slit is fitted	2 m	Opaque 0.85 dia. min.	
When 1-mm dia. slit is fitted	3 m	Opaque 1 dia. min.	
When 2-mm dia. slit is fitted	6 m	2 dia. (opaque object)	
When 3-mm dia. slit is fitted	9 m	3 dia. (opaque object)	
Without slit	10 m	Opaque 11 dia. min.	

### Accessories (Order Separately)

#### Mounting Brackets

Shape	Model	Quantity	Remarks
	E39-L6	1	For separate type, supplied with E3L-2RC4
	E39-L5	1	For diffuse reflective type; supplied with E3L-DS5OE4

Note: If a through-beam model is used, order two Mounting Brackets for the emitter and receiver respectively.

#### Sensitivity adjustment knob

Model	Quantity	Remarks
E39-G1	1	Supplied with the product.

Rating/performance

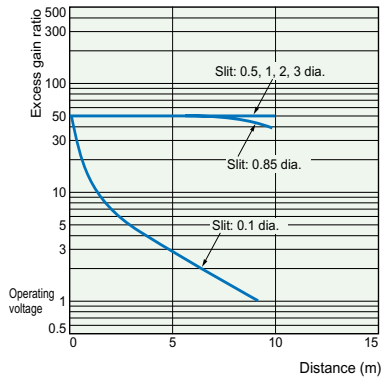
Sensing method		Through-beam	Diffuse-reflective
Item	Model	E3L-2RC4	E3L-DS50E4
Sensing distance		When 0.85-mm dia. slit is fitted: 2 m	500 mm [200 mm] * (White paper 2-mm width)
Standard sensing object		Opaque 0.85 dia. min.	---
Differential distance		---	20% max. of sensing distance
Directional angle		Emitter: 1° max., receiver: 20° max.	---
Light source (wave length)		Semiconductor laser diode (red) (670 nm) 480 μW	Semiconductor laser diode (infrared) (780 nm) 120 μW
Power supply voltage		12 to 24 VDC ±10%, ripple (p-p) : 10% max.	
Current consumption		Emitter/Receiver: 25 mA max.	40 mA max.
Control output		Load power supply voltage 24 VDC max., load current 100 mA max. (residual voltage: 2 V max.) NPN open collector output type Light-ON/Dark-ON cable connection selectable	Load power supply voltage 24 VDC max., load current 80 mA max. (residual voltage: 2 V max.) NPN voltage output type, Light-ON/Dark-ON cable connection selectable
Protective circuits		Protection from load short-circuit and reversed power supply connection	Reverse polarity protection, output short-circuit protection, mutual interference prevention
Response time		Operation or reset: 1 ms max.	Operation or reset: 500 μs max.
Sensitivity adjustment		Single-turn adjustment	
Ambient illuminance		Incandescent lamp: 3,000 lux max. Sunlight 10,000 lux max.	
Ambient temperature		Operating: -10°C to 40°C, Storage: -25°C to 55°C (with no icing or condensation)	Operating: -100° to 40°C, Storage: -400° to 70°C (with no icing or condensation)
Ambient humidity		Operating: 35% to 85% RH, Storage: 35% to 95% RH (with no icing or condensation)	
Insulation resistance		20 M Ω min. at 500 VDC	
Dielectric strength		1,000 VAC at 50/60 Hz for 1 minute	
Vibration resistance		10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions	
Shock resistance		Destruction: 500 m/s <sup>2</sup> for 3 times each in X, Y, and Z directions	
Protective structure		IEC 60529 IP67	
Connection method		Pre-wired models (standard length: 2 m)	
Weight (Packed state)		Approx. 330 g	Approx. 300 g
Material	Case	Zinc diecast	
	Lens	Emitter: Methacrylate, receiver: Polycarbonate	Acrylics
	Indicator window	Polycarbonate	
	Mounting Brackets	Steel	
Accessories		Mounting bracket (with screws), adjusting screwdriver, sensitivity adjuster, one set of slits, instruction manual	Mounting bracket (with screws), adjusting screwdriver, sensitivity adjuster, Standard-related labels (3 pcs.), instruction manual

\* Values in parentheses indicate the minimum required distance between the sensor and reflector.

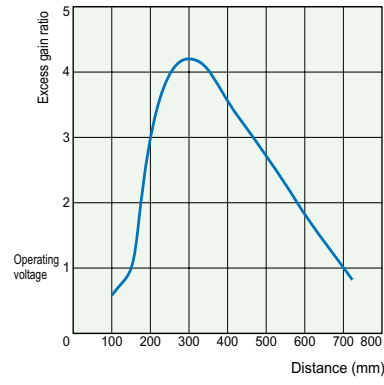
Characteristic data (typical)

Operating Range

Through-beam  
E3L-2RC4



Diffuse-reflective  
E3L-DS50E4



# Output Circuit Diagram

## NPN output

Model	Operating status of output transistor *1	Timing chart	Connections	Output circuit
E3L-2RC4	Light ON		Brown cable: +V Blue cable: 0 V	<p>(Through-beam receiver)</p>
	Dark ON		Brown cable: 0 V Blue cable: +V	
	(Through-beam emitter)			<p>When connecting pink cord of emitter to terminal 0 V of emitter, it becomes power supply indicator. When connecting pink cord of emitter to terminal output of receiver, it becomes ON-state indicator.</p>
E3L-DS50E4	Light ON		Brown cable: +V Blue cable: 0 V	
	Dark ON		Brown cable: 0 V Blue cable: +V	

\*1. Inverting the connection changes between Light-ON and Dark-ON.

\*2. Voltage output (when transistor circuit or like is connected)

Precautions

**Warning**

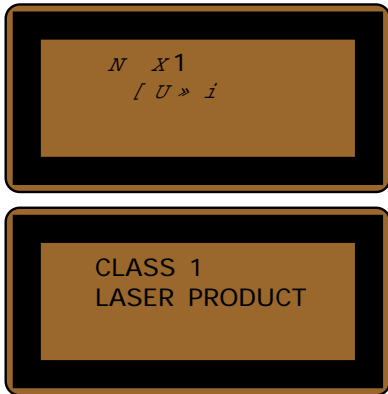
Be careful not to expose your eyes to the laser beam directly or to the light reflected by a mirror-smooth object.

The laser beam emitted from the laser has high power density and its entry to your eyes may cause blindness.



Labels related to laser

The E3L-DS50E4 has the following Class 1 label applied to the cable in accordance with the IEC Standards.



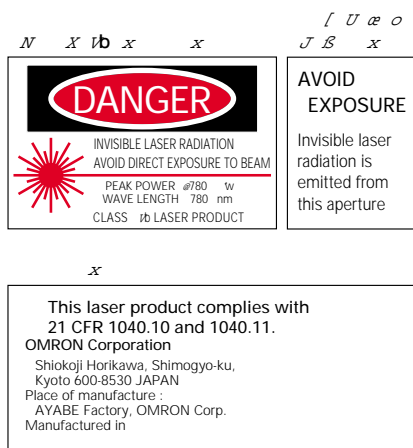
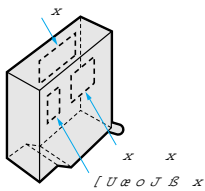
Label Indication for U.S. Export Models

The E3L laser photoelectric switch meets the standards required by the Food and Drug Administration (FDA) of the US. OMRON has also reported to the Center for Devices and Radiological Health (CDRH).

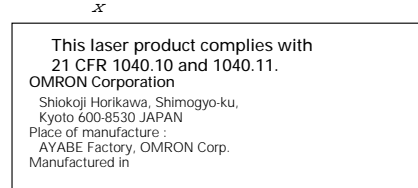
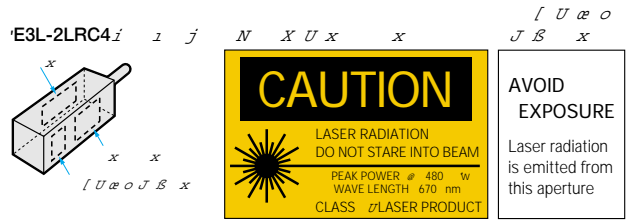
Labels (FDA Regulations)

- The E3L-DS50E4 has the label that conforms to the FDA Standards. When exporting it to the U.S.A., refer to the following diagram and change the label of the sensor unit.

E3L-DS50E4



- For the E3L-2LRC4, the following label is applied at the factory to the emitter of the E3L-2LRC4.



- The E3L is designed to be incorporated into final system equipment. When assembling it, follow the technological guidelines of the Standards given below.

21CFR1040.10 and 1040.11

Handling

- The E3L is a class 1 laser product. Avoid looking at the laser beam as much as possible.
- Users expose themselves to the risk of laser radiation if they use the E3L for any purposes other than those described in this data sheet.
- When you will be within 2 m of the emitter, wear laser safety goggles.

Laser safety goggles: Yamamoto Optics Co., Ltd. TEL. (06)6783-1101 Consult.

Maintenance and Repairs

- Users should not try to carry out repairs or maintenance of the E3L photoelectric switch, which contains no user serviceable parts. Refer all servicing to an authorized OMRON agent.
- Never disassemble the unit. Users expose themselves to the risk of laser radiation if they disassemble the device.

Correct Use

Safety Standards of Laser Beam

(For details, refer to "Safety Standards of Laser Beam". Page Rear B-80)

- The laser output of the E3L-DS50E4 is IEC-approved as Class 1 and U.S. FDA-approved as Class IIIb. The laser output of the E3L-2RC4 is IEC-approved as Class 2 and FDA-approved as Class II.
- The E3L-2E4-50 and E3L-DS50E4-50 equivalent to FDA Standard Class 1 are available for export to the U.S.A.

Sensor type	Through-beam	Diffuse-reflective
Item Model	E3L-2E4-50	E3L-DS50E4-50
Output	NPN output	
Emitting light source	Semiconductor laser ( $\lambda=780$ nm) 25 $\mu$ w max. Class I: IEC Standards, FDA Standards	
Response time	Operation or reset: 1 ms max.	Operation or reset: 3 ms max.

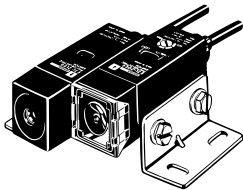
Note: The other specifications are equivalent to those of the standard models.

Dimensions (Unit: mm)

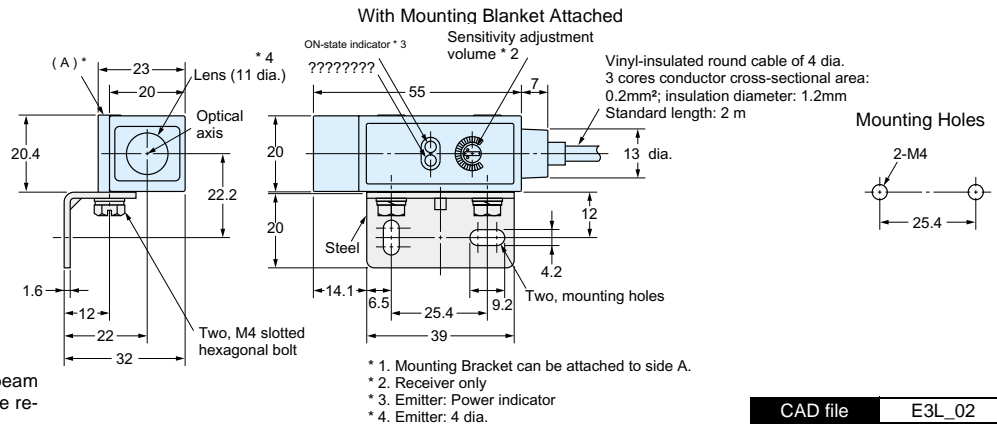
Sensors

Through-beam

E3L-2RC4



Emitter: E3L-2LRC4  
Receiver: E3L-2DC4

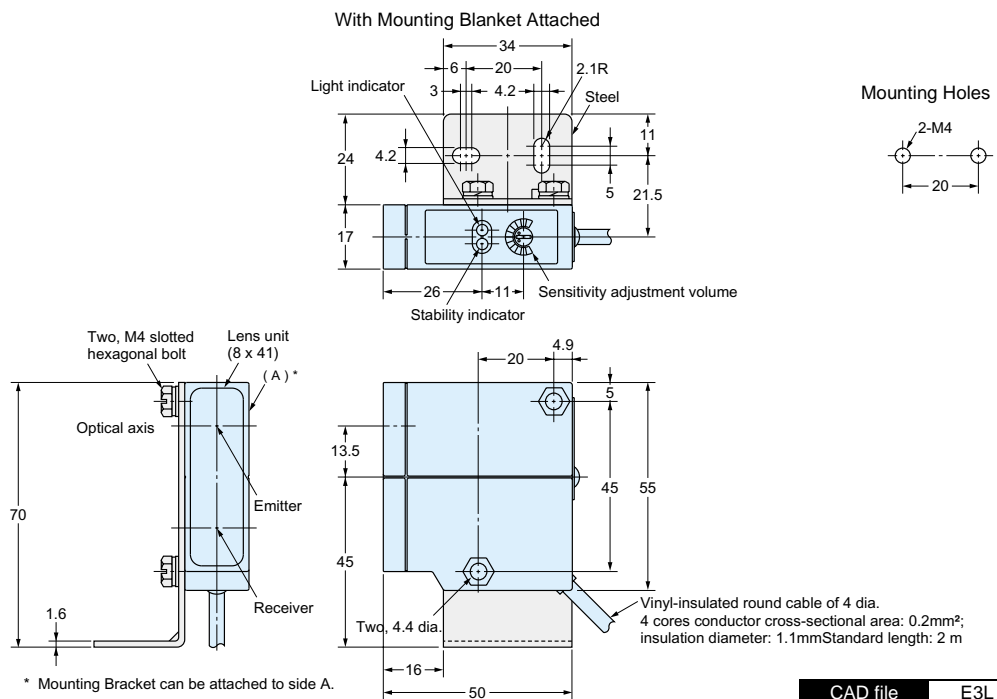
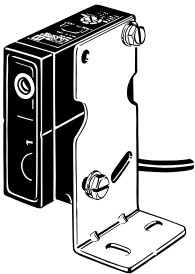


Note: The cable sheath of the through-beam model emitter is red, and those of the receiver and reflective model are gray.

CAD file E3L\_02

Diffuse-reflective

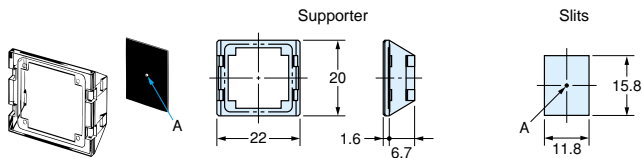
E3L-DS50E4



CAD file E3L\_03

Plug-in type round slit

(For though-beam E3L-2RC4)



	Dimension A	Material	Quantity
Supporter	-	Polycarbonate	1 pc. for receiver
Slits	0.1-mm dia.	SUS304	1 pc. for receiver (total 2 pcs.)
	0.85-mm dia.	PVC	

Seal type round slit

(For though-beam E3L-2RC4)



Dimension A	Material	Quantity
0.5 mm dia.	Polycarbonate	1 pc. for receiver (total 4 pcs.)
1-mm dia.		
2-mm dia.		
3-mm dia.		

\* Plug-in type round slit and seal type round slit are both attached to the through-beam E3L-2RC4.

Accessories (Order Separately)

