

### Threaded Cylindrical Photoelectric Sensors with Built-in Amplifier for Use as an Optical Proximity Switch

- M18 DIN-sized cylindrical housing
- Housing materials: plastic, nickel plated brass and stainless steel
- Axial and radial types (with integrated 90°-optics)
- Improved enclosure ratings (IP67)
- DC switching types with connectors for easy maintenance
- Full metal plug-in type
- Sensing distance separate type : 7 m
- Retro-reflective polarized type (MSR): 2 m
- Long detection distance (30 cm) with sensitivity adjuster for diffuse type
- Wide-beam characteristics (10 cm) for diffuse type
- Wide operating voltage range (10 to 30 VDC or 24 to 240VAC)
- Short-circuit and reverse connection protection (DC switching type)
- UL and CSA approved (AC switching types)
- UL listed (DC switching types)



## Selection Guide

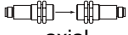
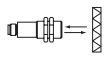



### ■ DC-Switching Models

Housing material: Plastic

Sensing method		Appearance	Connection method	Sensing distance	Model	
					PNP output	NPN output
Through-beam		axial	pre-wired	7 m	<b>E3F2-7B4</b>	<b>E3F2-7C4</b>
			M12 connector		<b>E3F2-7B4-P1</b>	<b>E3F2-7C4-P1</b>
Retro-reflective (incl. reflector E39-R1)	Non-polarizing (without MSR-function)	axial	pre-wired	0.1 - 2 m (with reflector E39-R1)	<b>E3F2-R2B4</b>	<b>E3F2-R2C4</b>
	Polarizing (with MSR-function)		M12 connector		—	—
	Non-polarizing (without MSR-function)	radial	pre-wired		—	—
	Polarizing (with MSR-function)		M12 connector		<b>E3F2-R2RB41</b>	<b>E3F2-R2RC41</b>
Diffuse reflective	Fixed sensing distance Wide-beam characteristics	axial	pre-wired	0.1 m	<b>E3F2-DS10B4-N</b>	<b>E3F2-DS10C4-N</b>
	Adjustable sensing distance		M12 connector		<b>E3F2-DS10B4-P1</b>	<b>E3F2-DS10C4-P1</b>
	Fixed sensing distance Wide-beam characteristics	radial	pre-wired	0.1 m	—	—
	Adjustable sensing distance		M12 connector		<b>E3F2-DS30B41</b>	<b>E3F2-DS30C41</b>
			M12 connector	0.3 m	<b>E3F2-DS30B4-P1</b>	<b>E3F2-DS30C4-P1</b>

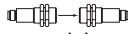
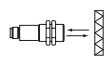



**Note** Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2RB4 2M or E3F2-R2RB4 5M). For other cable length please contact your OMRON sales representative.

## Housing material: Metal (Nickel plated brass)

Sensing method		Appearance	Connection method	Sensing distance	Model	
					PNP output	NPN output
Through-beam		 axial	pre-wired	7 m	<b>E3F2-7B4-M</b>	<b>E3F2-7C4-M</b>
			M12 connector		<b>E3F2-7B4-M1-M</b>	<b>E3F2-7C4-M1-M</b>
Retro-reflective (incl. reflector E39-R1)	Non-polarizing (without MSR-function)	 axial	pre-wired	0.1 - 2 m (with reflector E39-R1)	–	–
			M12 connector		–	–
	Polarizing (with MSR-function)	pre-wired	<b>E3F2-R2RB4-M</b>		<b>E3F2-R2RC4-M</b>	
			M12 connector		<b>E3F2-R2RB4-M1-M</b>	<b>E3F2-R2RC4-M1-M</b>
	Non-polarizing (without MSR-function)	 radial	pre-wired		–	–
			M12 connector		–	–
Polarizing (with MSR-function)	pre-wired	<b>E3F2-R2RB41-M</b>	<b>E3F2-R2RC41-M</b>			
		M12 connector	<b>E3F2-R2RB41-M1-M</b>	<b>E3F2-R2RC41-M1-M</b>		
Diffuse reflective	Fixed sensing distance Wide-beam characteristics	 axial	pre-wired	0.1 m	<b>E3F2-DS10B4-M</b>	<b>E3F2-DS10C4-M</b>
			M12 connector		<b>E3F2-DS10B4-M1-M</b>	<b>E3F2-DS10C4-M1-M</b>
	Adjustable sensing distance	pre-wired	<b>E3F2-DS30B4-M</b>	<b>E3F2-DS30C4-M</b>		
			M12 connector	<b>E3F2-DS30B4-M1-M</b>	<b>E3F2-DS30C4-M1-M</b>	
	Fixed sensing distance Wide-beam characteristics	 radial	pre-wired	0.1 m	–	–
			M12 connector		–	–
	Adjustable sensing distance	pre-wired	<b>E3F2-DS30B41-M</b>	<b>E3F2-DS30C41-M</b>		
			M12 connector	<b>E3F2-DS30B41-M1-M</b>	<b>E3F2-DS30C41-M1-M</b>	

**Note** Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2RB4-M 2M or E3F2-R2RB4-M 5M). For other cable length please contact your OMRON sales representative.

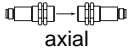
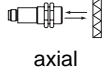
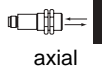
## Housing material: Metal (Stainless steel)

Sensing method		Appearance	Connection method	Sensing distance	Model	
					PNP output	NPN output
Through-beam		 axial	pre-wired	7 m	<b>E3F2-7B4-S</b>	<b>E3F2-7C4-S</b>
			M12 connector		<b>E3F2-7B4-M1-S</b>	<b>E3F2-7C4-M1-S</b>
Retro-reflective (incl. reflector E39-R1)	Non-polarizing (without MSR-function)	 axial	pre-wired	0.1 - 2 m (with reflector E39-R1)	–	–
			M12 connector		–	–
	Polarizing (with MSR-function)	pre-wired	<b>E3F2-R2RB4-S</b>		<b>E3F2-R2RC4-S</b>	
			M12 connector		<b>E3F2-R2RB4-M1-S</b>	<b>E3F2-R2RC4-M1-S</b>
	Non-polarizing (without MSR-function)	 radial	pre-wired		–	–
			M12 connector		–	–
Polarizing (with MSR-function)	pre-wired	<b>E3F2-R2RB41-S</b>	<b>E3F2-R2RC41-S</b>			
		M12 connector	<b>E3F2-R2RB41-M1-S</b>	<b>E3F2-R2RC41-M1-S</b>		
Diffuse reflective	Fixed sensing distance Wide-beam characteristics	 axial	pre-wired	0.1 m	<b>E3F2-DS10B4-S</b>	<b>E3F2-DS10C4-S</b>
			M12 connector		<b>E3F2-DS10B4-M1-S</b>	<b>E3F2-DS10C4-M1-S</b>
	Adjustable sensing distance	pre-wired	<b>E3F2-DS30B4-S</b>	<b>E3F2-DS30C4-S</b>		
			M12 connector	<b>E3F2-DS30B4-M1-S</b>	<b>E3F2-DS30C4-M1-S</b>	
	Fixed sensing distance Wide-beam characteristics	 radial	pre-wired	0.1 m	–	–
			M12 connector		–	–
	Adjustable sensing distance	pre-wired	<b>E3F2-DS30B41-S</b>	<b>E3F2-DS30C41-S</b>		
			M12 connector	<b>E3F2-DS30B41-M1-S</b>	<b>E3F2-DS30C41-M1-S</b>	

**Note** Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2RB4-S 2M or E3F2-R2RB4-S 5M). For other cable length please contact your OMRON sales representative.

## ■ AC-Switching Models

Housing material: Plastic

Sensing method		Appearance	Connection method	Sensing distance	Model	
					Light-ON	Dark-ON
Through-beam		 axial	pre-wired	3 m	E3F2-3Z1	E3F2-3Z2
Retro-reflective (incl. reflector E39-R1)	Non-polarizing (without MSR-function)	 axial	pre-wired	0.1 - 2 m (with reflector E39-R1)	E3F2-R2Z1	E3F2-R2Z2
Diffuse reflective	Fixed sensing distance Wide-beam characteristics	 axial	pre-wired	0.1 m	E3F2-DS10Z1-N	E3F2-DS10Z2-N

**Note** Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2Z1 2M or E3F2-R2Z1 5M). For other cable length please contact your OMRON sales representative.





## ■ Accessories (Order Separately)

Name	Sensing distance (typical) [1.]	Model	Remark
Reflectors	0.1 - 3.7 m (axial) 0.1 - 2.4 m (radial)	E39-R1	60 x 40 mm (included in some models)
	0.1 - 4.2 m (axial) 0.1 - 2.7 m (radial)	E39-R7	∅ 84 mm
	0.1 - 5.3 m (axial) 0.1 - 3.1 m (radial)	E39-R8	100 x 100 mm
Tape Reflectors		E39-RSA	35 x 10 mm
		E39-RSB	35 x 40 mm
		E39-RS3	80 x 70 mm
Lens Cap		E39-F31	
Mounting Bracket		Y92E-B18	

For detailed information about Accessories, refer to the main chapter "Accessories" at the end of the document.

**Note:** 1. Typical sensing distance corresponds to 80 % of the max. sensing distance. For details, please refer to "Engineering Data".

## ■ Sensor I/O Connectors

Cord	Shape	Cable type		Model
Standard	Straight 	Four-wire type	2 m	XS2F-D421-D80-A
			5 m	XS2F-D421-G80-A
	L-shaped 		2 m	XS2F-D422-D80-A
			5 m	XS2F-D422-G80-A
Vibration-proof robot cable	Straight 	Four-wire type	2 m	XS2F-D421-D80-R
			5 m	XS2F-D421-G80-R
	L-shaped 		2 m	XS2F-D422-D80-R
			5 m	XS2F-D422-G80-R

## Ordering Information: type list

### ■ DC-Switching Models, plastic

Model	Sensing method, sensing distance	Appearance	Connection (cable-length)	Control output	Comments
E3F2-7B4 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	PNP	Receiver and Emitter
E3F2-7B4-P1	Through-beam, 7 m	axial	Connector	PNP	Receiver and Emitter
E3F2-7C4 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	NPN	Receiver and Emitter
E3F2-7C4-P1	Through-beam, 7 m	axial	Connector	NPN	Receiver and Emitter
E3F2-7DB4 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	PNP	Receiver only
E3F2-7DB4-P1	Through-beam, 7 m	axial	Connector	PNP	Receiver only
E3F2-7DC4 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	NPN	Receiver only
E3F2-7DC4-P1	Through-beam, 7 m	axial	Connector	NPN	Receiver only
E3F2-7L 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	N.A.	Emitter only
E3F2-7L -P1	Through-beam, 7 m	axial	Connector	N.A.	Emitter only
E3F2-DS10B4-N 2M	Diffuse reflective, 0.1 m	axial	Pre-wired (2 m)*	PNP	Wide-beam characteristic
E3F2-DS10B4-P1	Diffuse reflective, 0.1 m	axial	Connector	PNP	Wide-beam characteristic
E3F2-DS10C4-N 2M	Diffuse reflective, 0.1 m	axial	Pre-wired (2 m)*	NPN	Wide-beam characteristic
E3F2-DS10C4-P1	Diffuse reflective, 0.1 m	axial	Connector	NPN	Wide-beam characteristic
E3F2-DS30B4 2M	Diffuse reflective, 0.3 m	axial	Pre-wired (2 m)*	PNP	Sensitivity adjuster
E3F2-DS30B41 2M	Diffuse reflective, 0.3 m	radial	Pre-wired (2 m)*	PNP	Sensitivity adjuster
E3F2-DS30B41-P1	Diffuse reflective, 0.3 m	radial	Connector	PNP	Sensitivity adjuster
E3F2-DS30B4-P1	Diffuse reflective, 0.3 m	axial	Connector	PNP	Sensitivity adjuster
E3F2-DS30C4 2M	Diffuse reflective, 0.3 m	axial	Pre-wired (2 m)*	NPN	Sensitivity adjuster
E3F2-DS30C41 2M	Diffuse reflective, 0.3 m	radial	Pre-wired (2 m)*	NPN	Sensitivity adjuster
E3F2-DS30C41-P1	Diffuse reflective, 0.3 m	radial	Connector	NPN	Sensitivity adjuster
E3F2-DS30C4-P1	Diffuse reflective, 0.3 m	axial	Connector	NPN	Sensitivity adjuster
E3F2-R2B4 2M	Retro-reflective, 2 m	axial	Pre-wired (2 m)*	PNP	Non-polarizing
E3F2-R2B4-E 2M	Retro-reflective, 2 m	axial	Pre-wired (2 m)*	PNP	Non-polarizing, without reflector
E3F2-R2B4-P1	Retro-reflective, 2 m	axial	Connector	PNP	Non-polarizing
E3F2-R2B4-P1-E	Retro-reflective, 2 m	axial	Connector	PNP	Non-polarizing, without reflector
E3F2-R2C4 2M	Retro-reflective, 2 m	axial	Pre-wired (2 m)*	NPN	Non-polarizing
E3F2-R2C4-E 2M	Retro-reflective, 2 m	axial	Pre-wired (2 m)*	NPN	Non-polarizing, without reflector
E3F2-R2C4-P1	Retro-reflective, 2 m	axial	Connector	NPN	Non-polarizing
E3F2-R2C4-P1-E	Retro-reflective, 2 m	axial	Connector	NPN	Non-polarizing, without reflector
E3F2-R2RB41 2M	Retro-reflective, 2 m	radial	Pre-wired (2 m)*	PNP	Polarizing
E3F2-R2RB41-E 2M	Retro-reflective, 2 m	radial	Pre-wired (2 m)*	PNP	Polarizing, without reflector
E3F2-R2RB41-P1	Retro-reflective, 2 m	radial	Connector	PNP	Polarizing
E3F2-R2RB41-P1-E	Retro-reflective, 2 m	radial	Connector	PNP	Polarizing, without reflector
E3F2-R2RC41 2M	Retro-reflective, 2 m	radial	Pre-wired (2 m)*	NPN	Polarizing
E3F2-R2RC41-E 2M	Retro-reflective, 2 m	radial	Pre-wired (2 m)*	NPN	Polarizing, without reflector
E3F2-R2RC41-P1	Retro-reflective, 2 m	radial	Connector	NPN	Polarizing
E3F2-R2RC41-P1-E	Retro-reflective, 2 m	radial	Connector	NPN	Polarizing, without reflector

\* Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2RB41 2M or E3F2-R2RB41 5M). For other cable length please contact your OMRON sales representative.

## ■ DC-Switching Models, metal (nickel plated brass)

Model	Sensing method, sensing range	Appearance	Connection (cable-length)	Control output	Comments
E3F2-7B4-M 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	PNP	Receiver and Emitter
E3F2-7B4-M1-M	Through-beam, 7 m	axial	Connector	PNP	Receiver and Emitter
E3F2-7C4-M 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	NPN	Receiver and Emitter
E3F2-7C4-M1-M	Through-beam, 7 m	axial	Connector	NPN	Receiver and Emitter
E3F2-7DB4-M 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	PNP	Receiver only
E3F2-7DB4-M1-M	Through-beam, 7 m	axial	Connector	PNP	Receiver only
E3F2-7DC4-M 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	NPN	Receiver only
E3F2-7DC4-M1-M	Through-beam, 7 m	axial	Connector	NPN	Receiver only
E3F2-7L-M 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	N.A	Emitter only
E3F2-7L-M1-M	Through-beam, 7 m	axial	Connector	N.A	Emitter only
E3F2-DS10B4-M 2M	Diffuse reflective, 0.1 m	axial	Pre-wired (2 m)*	PNP	Wide-beam characteristic
E3F2-DS10B4-M1-M	Diffuse reflective, 0.1 m	axial	Connector	PNP	Wide-beam characteristic
E3F2-DS10C4-M 2M	Diffuse reflective, 0.1 m	axial	Pre-wired (2 m)*	NPN	Wide-beam characteristic
E3F2-DS10C4-M1-M	Diffuse reflective, 0.1 m	axial	Connector	NPN	Wide-beam characteristic
E3F2-DS30B41-M 2M	Diffuse reflective, 0.3 m	radial	Pre-wired (2 m)*	PNP	Sensitivity adjuster
E3F2-DS30B41-M1-M	Diffuse reflective, 0.3 m	radial	Connector	PNP	Sensitivity adjuster
E3F2-DS30B4-M 2M	Diffuse reflective, 0.3 m	axial	Pre-wired (2 m)*	PNP	Sensitivity adjuster
E3F2-DS30B4-M1-M	Diffuse reflective, 0.3 m	axial	Connector	PNP	Sensitivity adjuster
E3F2-DS30C41-M 2M	Diffuse reflective, 0.3 m	radial	Pre-wired (2 m)*	NPN	Sensitivity adjuster
E3F2-DS30C41-M1-M	Diffuse reflective, 0.3 m	radial	Connector	NPN	Sensitivity adjuster
E3F2-DS30C4-M 2M	Diffuse reflective, 0.3 m	axial	Pre-wired (2 m)*	NPN	Sensitivity adjuster
E3F2-DS30C4-M1-M	Diffuse reflective, 0.3 m	axial	Connector	NPN	Sensitivity adjuster
E3F2-R2RB41-M 2M	Retro-reflective, 2 m	radial	Pre-wired (2 m)*	PNP	Polarizing
E3F2-R2RB41-M1-M	Retro-reflective, 2 m	radial	Connector	PNP	Polarizing
E3F2-R2RB41-M1-M-E	Retro-reflective, 2 m	radial	Connector	PNP	Polarizing, without reflector
E3F2-R2RB41-M-E 2M	Retro-reflective, 2 m	radial	Pre-wired (2 m)*	PNP	Polarizing, without reflector
E3F2-R2RB4-M 2M	Retro-reflective, 2 m	axial	Pre-wired (2 m)*	PNP	Polarizing
E3F2-R2RB4-M1-M	Retro-reflective, 2 m	axial	Connector	PNP	Polarizing
E3F2-R2RB4-M1-M-E	Retro-reflective, 2 m	axial	Connector	PNP	Polarizing, without reflector
E3F2-R2RB4-M-E 2M	Retro-reflective, 2 m	axial	Pre-wired (2 m)*	PNP	Polarizing, without reflector
E3F2-R2RC41-M 2M	Retro-reflective, 2 m	radial	Pre-wired (2 m)*	NPN	Polarizing
E3F2-R2RC41-M1-M	Retro-reflective, 2 m	radial	Connector	NPN	Polarizing
E3F2-R2RC41-M1-M-E	Retro-reflective, 2 m	radial	Connector	NPN	Polarizing, without reflector
E3F2-R2RC41-M-E 2M	Retro-reflective, 2 m	radial	Pre-wired (2 m)*	NPN	Polarizing, without reflector
E3F2-R2RC4-M 2M	Retro-reflective, 2 m	axial	Pre-wired (2 m)*	NPN	Polarizing
E3F2-R2RC4-M1-M	Retro-reflective, 2 m	axial	Connector	NPN	Polarizing
E3F2-R2RC4-M1-M-E	Retro-reflective, 2 m	axial	Connector	NPN	Polarizing, without reflector
E3F2-R2RC4-M-E 2M	Retro-reflective, 2 m	axial	Pre-wired (2 m)*	NPN	Polarizing, without reflector

\* Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2RB41-M 2M or E3F2-R2RB41-M 5M). For other cable length please contact your OMRON sales representative.

### ■ DC-Switching Models, metal (stainless steel)

Model	Sensing method, sensing range	Appearance	Connection (cable-length)	Control output	Comments
E3F2-7B4-M1-S	Through-beam, 7 m	axial	Connector	PNP	Receiver and Emitter
E3F2-7B4-S 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	PNP	Receiver and Emitter
E3F2-7C4-M1-S	Through-beam, 7 m	axial	Connector	NPN	Receiver and Emitter
E3F2-7C4-S 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	NPN	Receiver and Emitter
E3F2-7DB4-M1-S	Through-beam, 7 m	axial	Connector	PNP	Receiver only
E3F2-7DB4-S 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	PNP	Receiver only
E3F2-7DC4-M1-S	Through-beam, 7 m	axial	Connector	NPN	Receiver only
E3F2-7DC4-S 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	NPN	Receiver only
E3F2-7L-M1-S	Through-beam, 7 m	axial	Connector	N.A.	Emitter only
E3F2-7L-S 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	N.A.	Emitter only
E3F2-DS10B4-M1-S	Diffuse reflective, 0.1 m	axial	Connector	PNP	Wide-beam characteristic
E3F2-DS10B4-S 2M	Diffuse reflective, 0.1 m	axial	Pre-wired (2 m)*	PNP	Wide-beam characteristic
E3F2-DS10C4-M1-S	Diffuse reflective, 0.1 m	axial	Connector	NPN	Wide-beam characteristic
E3F2-DS10C4-S 2M	Diffuse reflective, 0.1 m	axial	Pre-wired (2 m)*	NPN	Wide-beam characteristic
E3F2-DS30B4-M1-S	Diffuse reflective, 0.3 m	axial	Connector	PNP	Sensitivity adjuster
E3F2-DS30B4-S 2M	Diffuse reflective, 0.3 m	axial	Pre-wired (2 m)*	PNP	Sensitivity adjuster
E3F2-DS30C4-M1-S	Diffuse reflective, 0.3 m	axial	Connector	NPN	Sensitivity adjuster
E3F2-DS30C4-S 2M	Diffuse reflective, 0.3 m	axial	Pre-wired (2 m)*	NPN	Sensitivity adjuster
E3F2-R2RB4-M1-S	Retro-reflective, 2 m	axial	Connector	PNP	Polarizing
E3F2-R2RB4-M1-S-E	Retro-reflective, 2 m	axial	Connector	PNP	Polarizing, without reflector
E3F2-R2RB4-S 2M	Retro-reflective, 2 m	axial	Pre-wired (2 m)*	PNP	Polarizing
E3F2-R2RB4-S-E 2M	Retro-reflective, 2 m	axial	Pre-wired (2 m)*	PNP	Polarizing, without reflector
E3F2-R2RC4-M1-S	Retro-reflective, 2 m	axial	Connector	NPN	Polarizing
E3F2-R2RC4-M1-S-E	Retro-reflective, 2 m	axial	Connector	NPN	Polarizing, without reflector
E3F2-R2RC4-S 2M	Retro-reflective, 2 m	axial	Pre-wired (2 m)*	NPN	Polarizing
E3F2-R2RC4-S-E 2M	Retro-reflective, 2 m	axial	Pre-wired (2 m)*	NPN	Polarizing, without reflector

\* Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2RB41-S 2M or E3F2-R2RB41-S 5M). For other cable length please contact your OMRON sales representative.

### ■ AC-Switching Models, plastic

Model	Sensing method, sensing range	Appearance	Connection (cable-length)	Control output	Comments
E3F2-3LZ 2M	Through-beam, 3 m	axial	Pre-wired (2 m)*	N.A.	Emitter only
E3F2-3DZ1 2M	Through-beam, 3 m	axial	Pre-wired (2 m)*	Light-ON	Receiver only
E3F2-3DZ2 2M	Through-beam, 3 m	axial	Pre-wired (2 m)*	Dark-ON	Receiver only
E3F2-3Z1 2M	Through-beam, 3 m	axial	Pre-wired (2 m)*	Light-ON	Receiver and Emitter
E3F2-3Z2 2M	Through-beam, 3 m	axial	Pre-wired (2 m)*	Dark-ON	Receiver and Emitter
E3F2-R2Z1 2M	Retro-reflective, 2 m	axial	Pre-wired (2 m)*	Light-ON	Non-polarizing
E3F2-R2Z2 2M	Retro-reflective, 2 m	axial	Pre-wired (2 m)*	Dark-ON	Non-polarizing
E3F2-R2Z1-E 2M	Retro-reflective, 2 m	axial	Pre-wired (2 m)*	Light-ON	Non-polarizing, without reflector
E3F2-R2Z2-E 2M	Retro-reflective, 2 m	axial	Pre-wired (2 m)*	Dark-ON	Non-polarizing, without reflector
E3F2-DS10Z1-N 2M	Diffuse reflective, 0.1 m	axial	Pre-wired (2 m)*	Light-ON	Wide-beam characteristic
E3F2-DS10Z2-N 2M	Diffuse reflective, 0.1 m	axial	Pre-wired (2 m)*	Dark-ON	Wide-beam characteristic

\* Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2Z1 2M or E3F2-R2Z1 5M). For other cable length please contact your OMRON sales representative.

# Specifications

## ■ Ratings / Characteristics of DC Switching Models

Item	E3F2-7B4-□ E3F2-7C4-□	E3F2-R2B4-□ E3F2-R2C4-□	E3F2-R2RB4-□ E3F2-R2RC4-□ E3F2-R2RB41-□ E3F2-R2RC41-□	E3F2-DS10B4-□ E3F2-DS10C4-□	E3F2-DS30B4-□ E3F2-DS30C4-□ E3F2-DS30B41-□ E3F2-DS30C41-□
Sensing method	Through-beam	Retro-reflective		Diffuse reflective	
		non-polarizing (without MSR function)	polarizing (with MSR function)	wide-beam characteristic	adjustable sensing distance
Power supply voltage	10 to 30 V DC				
Current consumption	45 mA max.	25 mA max.	30 mA max.	25 mA max.	30 mA max.
Rated sensing distance [1.]	7m	0.1 - 2 m (with reflector E39-R1)	0.1 - 2 m (with reflector E39-R1)	0.1 m (5 x 5 cm white mat paper)	0.3 m (10 x 10 cm white mat paper)
Typical sensing distance for different reflector types (ref. to accessories) [2.]	–	E39-R1:4.0 m E39-R7:4.5 m E39-R8:5.3 m	E39-R1: axial 3.7 m radial 2.4 m E39-R7: axial 4.2 m radial 2.7 m E39-R8: axial 5.3 m radial 3.1 m	–	–
Standard object	Opaque: 11 mm dia. min.	Opaque: 56 mm dia. min.		–	
Directional angle	3° to 20°	3° to 20°	3° to 20°	–	
Differential travel (hysteresis)	–			20 % max.	
Response time	Operation and Reset: 2.5 ms max.				
Control output	Transistor (open collector), load current: 100 mA max. (residual voltage: 2 V max.)				
Power reset time	50 ms				
Ambient illumination	Incandescent lamp: 3000 lx max. Sunlight: 10000 lx max.				
Ambient temperature	Operating: -25 to 55 °C / Storage: -30 to 70 °C (with no icing or condensation)				
Ambient humidity	Operating: 35 % to 85 % / Storage: 35 % to 95 % (without condensation)				
Insulation resistance	20 MΩ min. at 500 V DC between current carrying parts and case				
Dielectric strength	1000 VAC max. , 50 / 60 Hz for 1 min between current carrying parts and case				
Vibration resistance	10 to 55 Hz, 1.5 mm double amplitude for 2 hrs each direction (X, Y, Z)				
Shock resistance	Destruction: 500 m/s <sup>2</sup> each direction (X, Y, Z)				
Enclosure ratings	IP67 [3.]; NEMA 1, 2, 4				
Light source	Infrared LED (880 nm)		Red LED (660 nm)	Infrared LED (880 nm)	
Indicators	Light incident / power indicator for light source (red)				
Sensitivity adjustment	Fixed				Adjustable
Connection method	2 m, 5 m pre-wired cable (PVC, dia. 4 mm (18 / 0.12) [4.]) or M12-connector				
Operation mode	Light-ON or Dark-ON selectable by wiring				
Weight (approx.)					
Plastic case	pre-wired (2 m)	120 g		60 g	
	connector	40 g		20 g	
Metal case	pre-wired (2 m)	180 g		90 g	
	connector	120 g		50 g	
Circuit protection	Output short-circuit and power supply reverse polarity				
Housing materials	Plastic	Plastic	Plastic (only radial type)	Plastic	Plastic
	Nickel brass	–	Nickel brass	Nickel brass	Nickel brass
	Stainless steel [5.]	–	Stainless steel [5.]	Stainless steel [5.]	Stainless steel [5.]

- Note:**
1. For stable sensing distance in detail, please refer to "Engineering Data"
  2. Typical sensing distance corresponds to 80 % of the max. sensing distance.
  3. The enclosure rating IP67 of OMRON internal standards correspond to stricter test requirements than the standard IEC 60529 (refer to chapter "Precautions")
  4. For other cable materials (e.g. PUR) please contact your OMRON sales representative.
  5. Material-specification for stainless steel housing case: 1.4305 (W.-No.), 303 (AISI), 2346 (SS). For other stainless steel materials please contact your OMRON sales representative.

## ■ Ratings / Characteristics of AC Switching Models

Item	E3F2-3Z1 E3F2-3Z2	E3F2-R2Z1 E3F2-R2Z2	E3F2-DS10Z1 E3F2-DS10Z2
Sensing method	Through-beam	Non-polarizing retro-reflective	Diffuse reflective (wide-beam characteristic)
Power supply voltage	24 to 240 VAC $\pm$ 10 %, 50 / 60 Hz		
Current consumption	10 mA max.	5 mA max.	
Rated sensing distance[1.]	3 m	0.1 - 2 m (with reflector E39-R1)	0.1 m (5 x 5 cm white mat paper)
Typical sensing distance for different reflector types [2.]	–	E39-R1: 3,4 m E39-R7: 3,9 m E39-R8: 5,2 m	–
Detectable object	Opaque object: 11 mm min.	Opaque object: 56 mm min.	Opaque objects
Directional angle	3° to 20°		–
Differential travel	–		20 % max.
Response time	30 ms max.		
Control output	AC solid state (SCR) 200 mA max.; residual voltage: 5 V max. at 200 mA		
Power reset time	100 ms		
Ambient illumination	Incandescent lamp: 3000 lx max. Sunlight: 10000 lx max.		
Ambient temperature [5.]	Operating: -25 to 55 °C / Storage: -30 to 70 °C (with no icing or condensation)		
Ambient humidity	Operating: 35 % to 85 % / Storage: 35 % to 95 % (without condensation)		
Insulation resistance	20 M $\Omega$ min. at 500 V DC between current carrying parts and case		
Dielectric strength	1500 VAC, 50 / 60 Hz for 1 min between current carrying parts and case		
Vibration resistance	10 to 55 Hz, 1.5 mm double amplitude for 2 hrs each direction (X, Y, Z)		
Shock resistance	500 m/sqr (approx. 50 g) for each direction (X, Y, Z)		
Enclosure rating	IP67 [3.]; NEMA 1, 2, 4		
Light source	Infrared LED (880 nm)		
Indicators	Light incident/power indicator for light source (red)		
Sensitivity adjustment	Fixed		
Connection method	2 m, 5 m pre-wired cable (PVC dia. 4 mm (14 / 0.15) [4.])		
Operation mode	Light-ON or Dark-ON (fixed)		
Circuit protection	None		
Weight (approx.)	110 g (pre-wired 2 m cable)		
Housing materials	Case: ABS, lens: Acrylate resin		

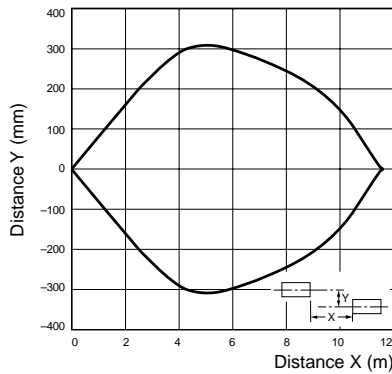
- Note:**
1. For stable sensing distance in detail, please refer to "Engineering Data"
  2. Typical sensing distance corresponds to 80 % of the max. sensing distance.
  3. The enclosure rating IP67 of OMRON internal standards correspond to stricter test requirements than the standard IEC 60529 (refer to chapter "Precautions")
  4. For other cable materials (e.g. PUR) please contact your OMRON sales representative.



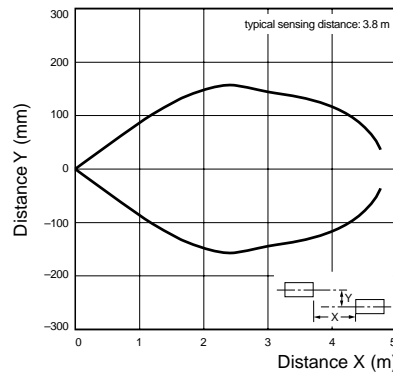
# Engineering Data (Typical)

## ■ Operating Range (typical)

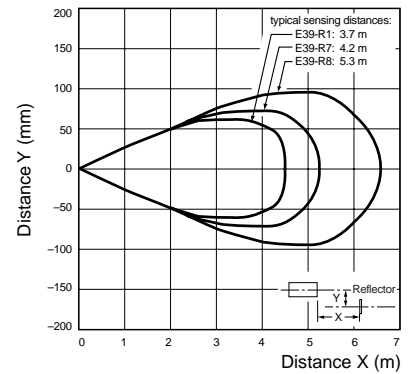
**Through-beam Models (axial)**  
E3F2-7□4-□



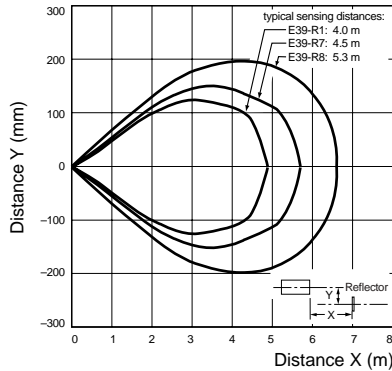
**Through-beam Models (axial)**  
E3F2-3Z□



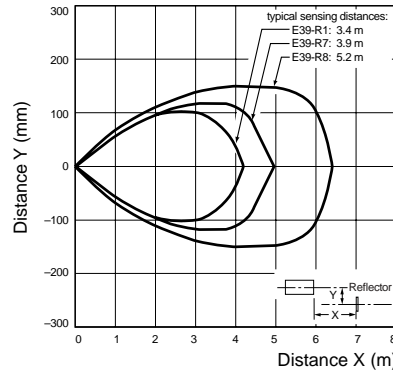
**Retro-reflective Models (axial)**  
E3F2-R2R□4-□ (polarizing)  
and reflectors



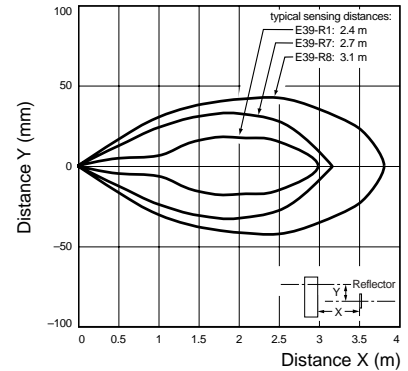
**Retro-reflective Models (axial)**  
E3F2-R2□4-□ (non polarizing)  
and reflectors



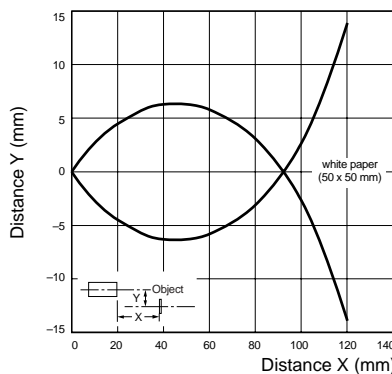
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E3F2-R2Z□ (non polarizing)  
and reflectors



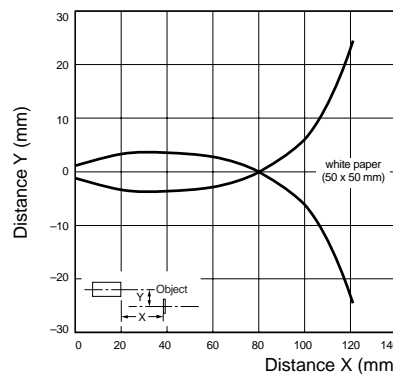
**Retro-reflective Models (radial)**  
E3F2-R2R□41-□ (polarizing)  
and reflectors



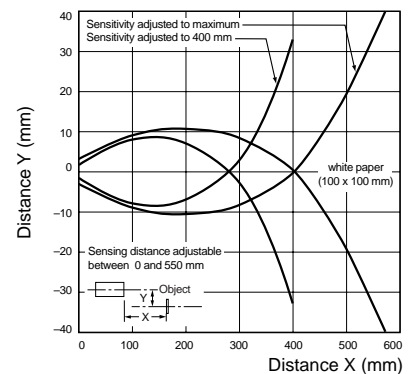
**Diffuse reflective Models (axial)**  
E3F2-DS10□4-□ (wide-beam type)



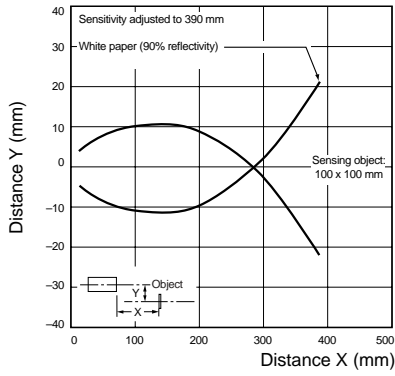
**Diffuse reflective Models (axial)**  
E3F2-DS10Z-□ (wide-beam type)



**Diffuse reflective Models (axial)**  
E3F2-DS30□4-□

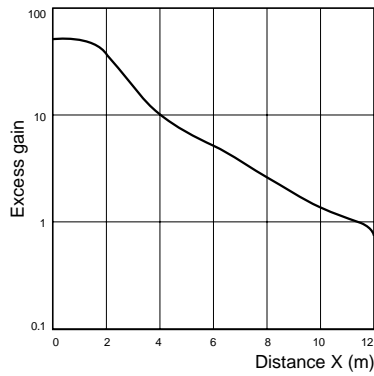


**Diffuse reflective Models (radial)**  
**E3F2-DS30□41-□**

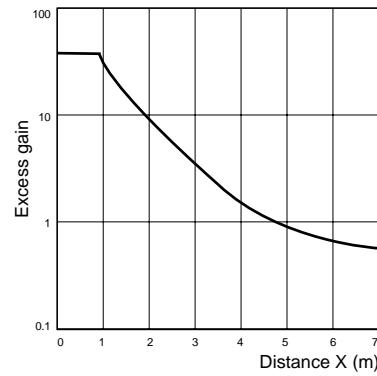


**■ Excess Gain Ratio vs. Distance (typical)**

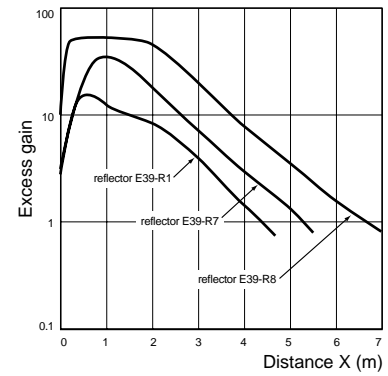
**Through-beam Models (axial)**  
**E3F2-7□4-□**



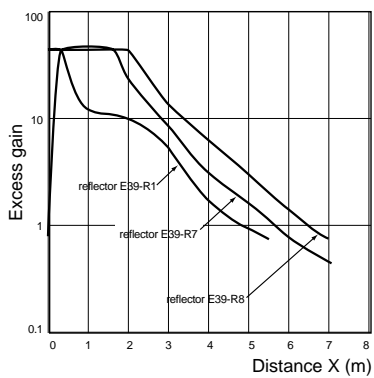
**Through-beam Models (axial)**  
**E3F2-3Z□**



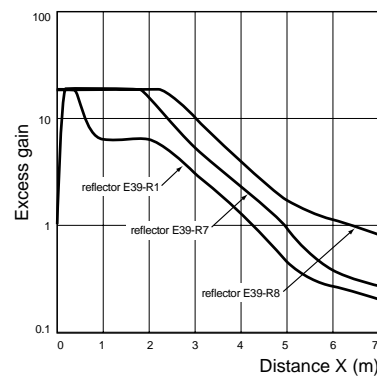
**Retro-reflective Models (axial)**  
**E3F2-R2R□4-□ (polarizing)**  
**and reflectors**



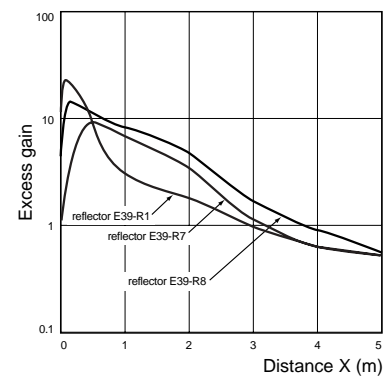
**Retro-reflective Models (axial)**  
**E3F2-R2□4-□ (non polarizing)**  
**and reflectors**



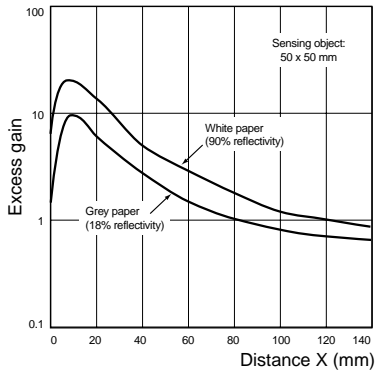
**Retro-reflective Models (axial)**  
**E3F2-R2Z□ (non polarizing)**  
**and reflectors**



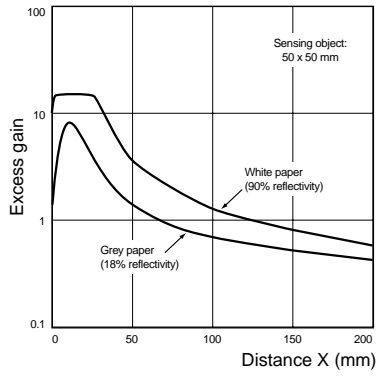
**Retro-reflective Models (radial)**  
**E3F2-R2R□41-□ (polarizing)**  
**and reflectors**



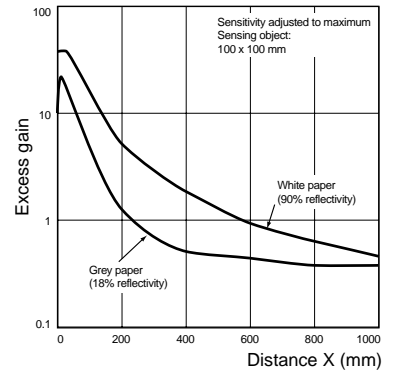
**Diffuse reflective Models (axial)**  
**E3F2-DS10□4-□ (wide-beam type)**



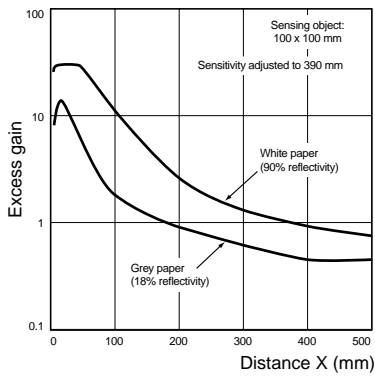
**Diffuse reflective Models (axial)**  
**E3F2-DS10Z-□ (wide-beam type)**



**Diffuse reflective Models (axial)**  
**E3F2-DS30□4-□**



**Diffuse reflective Models (radial)**  
**E3F2-DS30□41-□**

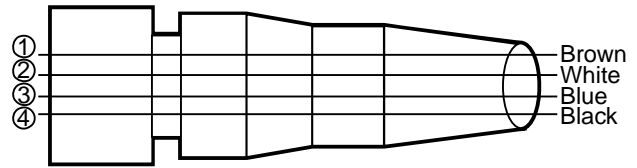


# Operation

## ■ Output Circuits

### Structure of Sensor I/O Connector

Classification	Wire color	Connector pin No.	Use
DC	Brown	①	Power supply (+V)
	White	②	Mode selection Lon/Don
	Blue	③	Power supply (0 V)
	Black	④	Output



XS2F-D42□-D80-□  
XS2F-G42□-G80-□

### PNP Output

Model	Output transistor status	Timing chart	Connection method	Output circuit
E3F2-7B4 E3F2-7B4-M E3F2-7B4-M1-M E3F2-7B4-M1-S E3F2-7B4-P1 E3F2-7B4-S E3F2-DS10B4-M E3F2-DS10B4-M1-M E3F2-DS10B4-M1-S E3F2-DS10B4-N E3F2-DS10B4-P1 E3F2-DS10B4-S E3F2-DS30B4 E3F2-DS30B41 E3F2-DS30B41-M E3F2-DS30B41-M1-M E3F2-DS30B41-P1 E3F2-DS30B4-M E3F2-DS30B4-M1-M E3F2-DS30B4-M1-S E3F2-DS30B4-P1 E3F2-DS30B4-S E3F2-R2B4 E3F2-R2B4-P1 E3F2-R2RB41 E3F2-R2RB41-M E3F2-R2RB41-M1-M E3F2-R2RB41-P1 E3F2-R2RB4-M E3F2-R2RB4-M1-M E3F2-R2RB4-M1-S E3F2-R2RB4-S	ON when light is incident. (Light-ON)		<p>Connect the pink (Pin ②) and brown (Pin ①) cords or open the pink cord (Pin ②).</p>	<p>Through-beam emitter</p>
	ON when light is interrupted. (Dark-ON)		<p>Connect the pink and blue cords.</p>	

**Note** Terminal numbers for connector type.

NPN Output

Model	Output transistor status	Timing chart	Connection method	Output circuit
E3F2-7C4 E3F2-7C4-M E3F2-7C4-M1-M E3F2-7C4-M1-S E3F2-7C4-P1 E3F2-7C4-S E3F2-DS10C4-M E3F2-DS10C4-M1-M E3F2-DS10C4-M1-S E3F2-DS10C4-N E3F2-DS10C4-P1 E3F2-DS10C4-S E3F2-DS30C4 E3F2-DS30C41 E3F2-DS30C41-M E3F2-DS30C41-M1-M E3F2-DS30C41-P1 E3F2-DS30C4-M E3F2-DS30C4-M1-M E3F2-DS30C4-M1-S E3F2-DS30C4-P1 E3F2-DS30C4-S E3F2-R2C4 E3F2-R2C4-P1 E3F2-R2RC41 E3F2-R2RC41-M E3F2-R2RC41-M1-M E3F2-R2RC41-P1 E3F2-R2RC4-M E3F2-R2RC4-M1-M E3F2-R2RC4-M1-S E3F2-R2RC4-S	—	—	—	<p>Through-beam emitter</p> <p>Connector Pin Arrangement</p>
E3F2-DS30C41 E3F2-DS30C41-M E3F2-DS30C41-M1-M E3F2-DS30C41-P1 E3F2-DS30C4-M E3F2-DS30C4-M1-M E3F2-DS30C4-M1-S E3F2-DS30C4-P1 E3F2-DS30C4-S	ON when light is incident. (Light-ON)	<p>Incident Interrupted</p> <p>Light indicator (red) ON OFF</p> <p>Output transistor ON OFF</p> <p>Load (relay) Operate Release</p>	Connect the pink (Pin ②) and brown (Pin ①) cords or open the pink cord (Pin ②).	<p>Connector Pin Arrangement</p>
E3F2-R2C4 E3F2-R2C4-P1 E3F2-R2RC41 E3F2-R2RC41-M E3F2-R2RC41-M1-M E3F2-R2RC41-P1 E3F2-R2RC4-M E3F2-R2RC4-M1-M E3F2-R2RC4-M1-S E3F2-R2RC4-S	ON when light is interrupted. (Dark-ON)	<p>Incident Interrupted</p> <p>Light indicator (red) ON OFF</p> <p>Output transistor ON OFF</p> <p>Load (relay) Operate Release</p>	Connect the pink and blue cords.	<p>Connector Pin Arrangement</p>

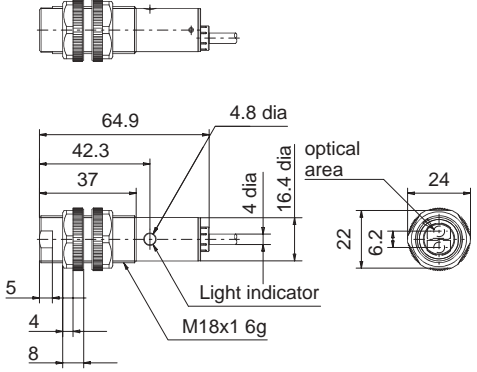
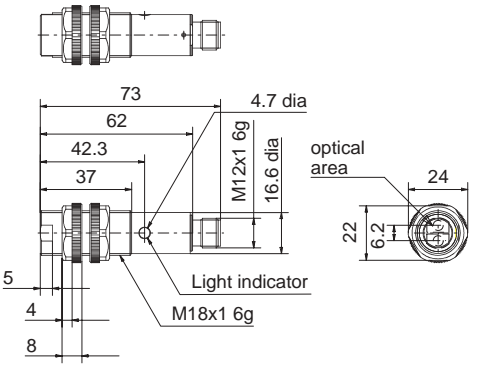
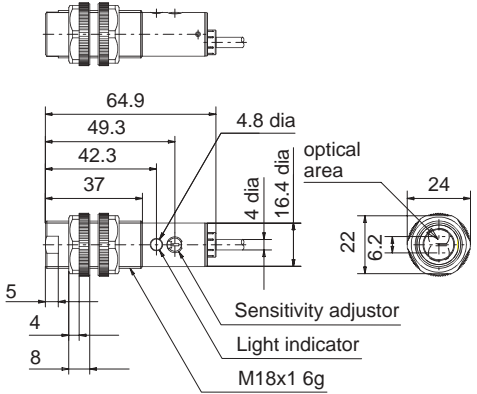
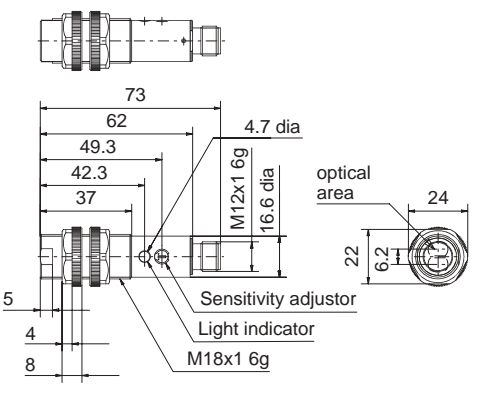
Note Terminal numbers for connector type.

AC Output

Model	Output transistor status	Timing chart	Connection method	Output circuit
E3F2-3LZ	—	—	—	<p>Through-beam emitter</p>
E3F2-3Z1 E3F2-R2Z1 E3F2-DS10Z1-N	ON when light is incident. (Light-ON)	<p>Incident Interrupted</p> <p>Light indicator (red) ON OFF</p> <p>Output transistor ON OFF</p> <p>Load (relay) Operate Release</p>	—	
E3F2-3Z2 E3F2-R2Z2 E3F2-DS10Z2-N	ON when light is interrupted. (Dark-ON)	<p>Incident Interrupted</p> <p>Light indicator (red) ON OFF</p> <p>Output transistor ON OFF</p> <p>Load (relay) Operate Release</p>	—	

# Dimensions Note: All units are in millimeters unless otherwise indicated

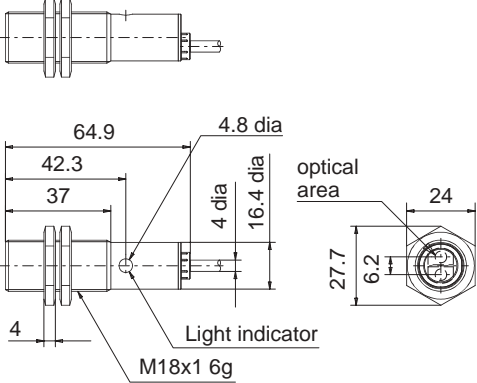
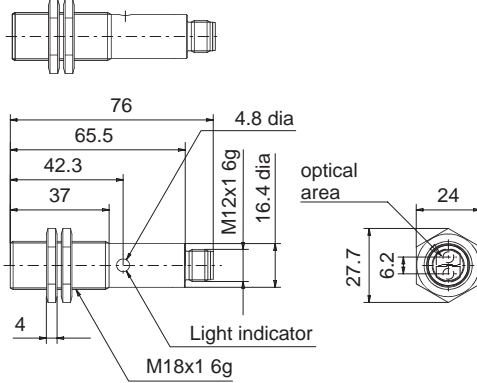
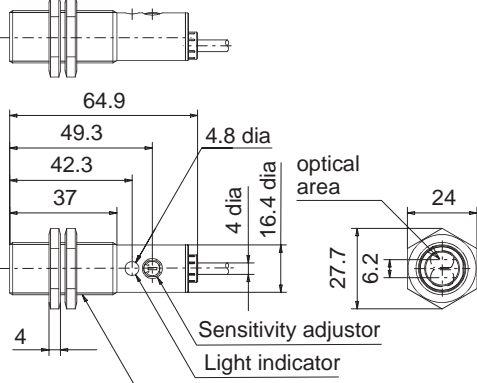
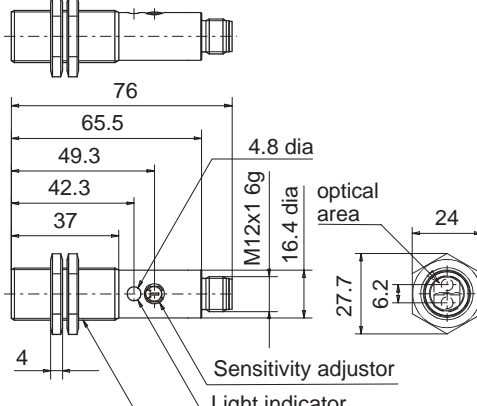
## ■ DC-Switching Models, plastic, axial type

Cable type	Connector type
<p>Without potentiometer</p> <p><b>E3F2-7L</b>  <b>E3F2-7D□4</b>  <b>E3F2-R2□4</b>  <b>E3F2-DS10□4-N</b></p> 	<p><b>E3F2-7L-P1</b>  <b>E3F2-7D□4 -P1</b>  <b>E3F2-R2□4-P1</b>  <b>E3F2-DS10□4-P1</b></p> 
<p>With potentiometer</p> <p><b>E3F2-DS30□4</b></p> 	<p><b>E3F2-DS30□4-P1</b></p> 

■ DC-Switching Models, plastic, radial type

Cable type	Connector type
<p>Without potentiometer</p> <p><b>E3F2-R2R□41</b></p>	<p><b>E3F2-R2R□41-P1</b></p>
<p>With potentiometer</p> <p><b>E3F2-DS30□41</b></p>	<p><b>E3F2-DS30□41-P1</b></p>

■ DC-Switching Models, metal (brass and stainless steel), axial type

Cable type	Connector type
<p>Without potentiometer</p> <p>E3F2-7L-M      E3F2-7L-S                      E3F2-7D□4-M      E3F2-7D□4-S                      E3F2-R2R□4-M      E3F2-R2R□4-S                      E3F2-DS10□4-M      E3F2-DS10□4-S</p> 	<p>E3F2-7L-M1-M      E3F2-7L-M1-S                      E3F2-7D□4-M1-M      E3F2-7D□4-M1-S                      E3F2-R2R□4-M1-M      E3F2-R2R□4-M1-S                      E3F2-DS10□4-M1-M      E3F2-DS10□4-M1-S</p> 
<p>With potentiometer</p> <p>E3F2-DS30□4-M      E3F2-DS30□4-S</p> 	<p>E3F2-DS30□4-M1-M      E3F2-DS30□4-M1-S</p> 



■ DC-Switching Models, metal (brass and stainless steel), radial type

Cable type	Connector type
Without potentiometer	
<p><b>E3F2-R2R□41-M E3F2-R2R□41-S</b></p>	<p><b>E3F2-R2R□41-M1 E3F2-R2R□41-M1-S</b></p>
With potentiometer	
<p><b>E3F2-DS30□41-M E3F2-DS30□41-S</b></p>	<p><b>E3F2-DS30□41-M1-M E3F2-DS30□41-M1-S</b></p>

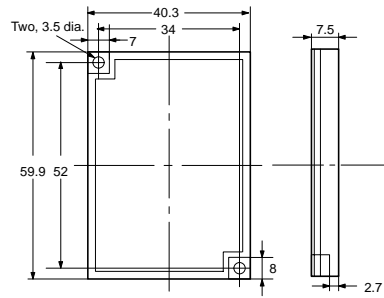
■ AC-Switching Models, plastic, axial type

Cable type
Without potentiometer
<p><b>E3F2-3Z□ E3F2-R2Z□ E3F2-DS10Z□-N</b></p>

■ Accessories (Order Separately)

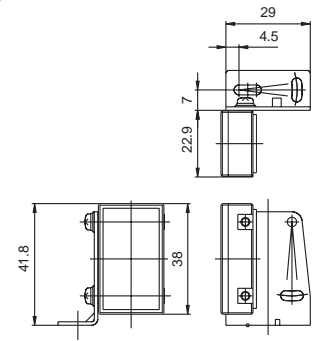
Reflectors

E39-R1



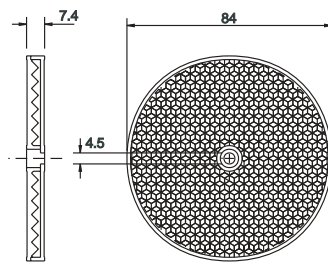
**Material**  
Surface: Acrylic resin  
Backside: ABS resin

E39-R3 (incl. mounting bracket)

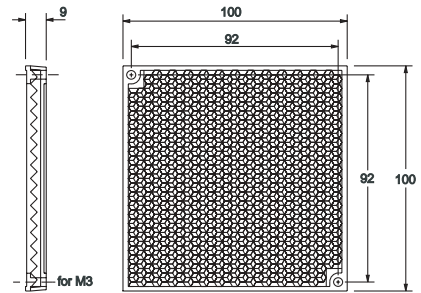


**Material**  
Surface: Acrylic resin  
Backside: ABS resin

E39-R7

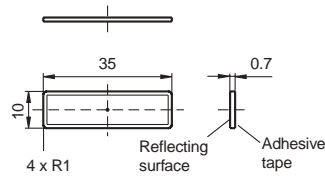


E39-R8

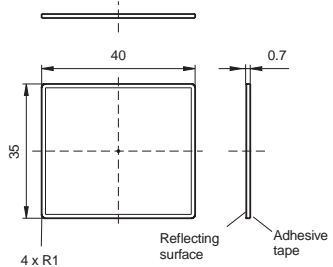
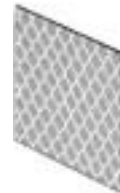


Tape Reflectors

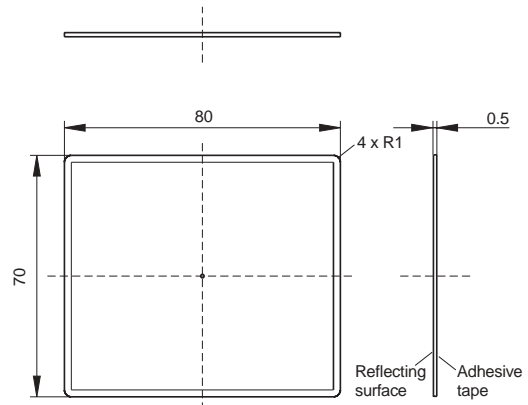
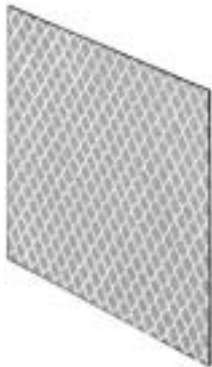
E39-RSA



E39-RSB



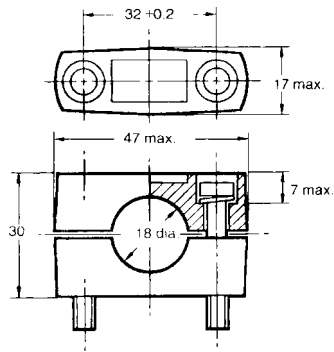
E39-RS3



**Material:** Acrylic resin

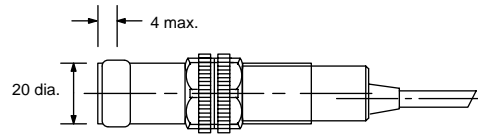
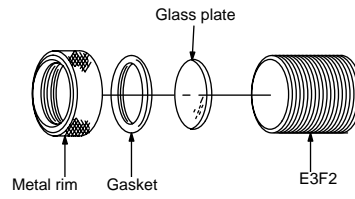
Mounting

Mounting Bracket  
Y92E-B18



**Note:**  
Hexagonal bolt: M5 x 32  
Material: plastic

Lens Cap  
E39-F31



## Precautions

### WARNING

The E3F2 Photoelectric Sensor is not a safety component for ensuring the safety of people which is defined in EC directive (91/368/EEC) and covered by separate European standards or by any other regulations or standards.

### Degree of protection

The E3F2 photoelectric sensors have a degree of protection rated with IP67. In this case, the sensors have passed the OMRON heat shock test before the IP67-test of IEC 60529 (submersion at 1m water depth for 30 min). Afterwards the sensors have been tested according to the OMRON waterproof test.

**Heat shock:** Alternating, fast temperature changes between -25°C and +55°C are executed for 5 cycles and 1 hour for each temperature. Function and isolation is checked.

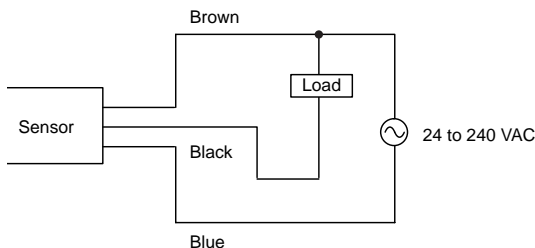
**Water proof:** The sensors are submersed alternating in water of +2°C and +55°C. 20 cycles with 1 hour for each temperature are executed. Function, water tightness and electrical isolation is checked.

Do not subject the photoelectric sensor to excessive shock when mounting, keeping within IP 67 standards.

### Wiring

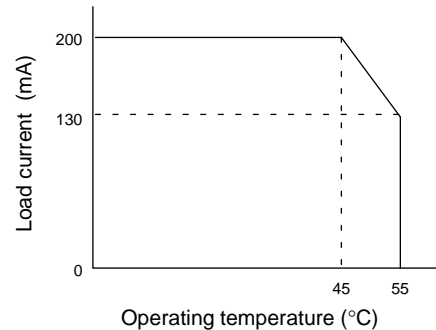
If the input/output lines of the photoelectric sensor are placed in the same conduit or duct as power lines or high-voltage lines, the photo-electric sensor could be induced to malfunction, or even be damaged, by electrical noise. Separate the wiring, or use shielded lines as input/output lines to the photoelectric sensor.

Do not connect the black wire to the brown wire without a load. Direct connection of these wires may damage the photoelectric sensor (AC switching type).



When you use the photoelectric sensor in the vicinity of an inverter motor, be sure to connect the protective earth ground wire of the motor to earth. Failure to ground the motor may result in malfunction of the sensor.

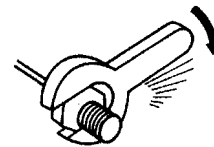
When you use the photoelectric sensor at temperatures over 45°C, the load current must be within the described values as shown in the figure below.



### Mounting

Do not exceed a torque of

- 2.0 Nm ( 20 kgf cm) when tightening mounting nuts for plastic models
- 20.0 Nm (200 kgf cm) when tightening mounting nuts for metal models



**ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.**

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E224-E2-1

**In the interest of product improvement, specifications are subject to change without notice.**

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