OMRON

Cylindrical M18 photoelectric sensor for AC power supply

E3F2-□Z

- 24 to 240 VAC power supply
- UL and CSA approved

Selection Guide

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	Non-polarizing (without MSR function)	axial	pre-wired	0.1 - 2 m (with reflector E39-R1)	**E3F2-R2Z1-E**	**E3F2-R2Z2-E**
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.

Ordering Information: type list

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	Retroreflective, 2 m	axial	Pre-wired (2 m)*	Light-ON	Non-polarizing, incl. E39-R1
E3F2-R2Z2 2M	Retroreflective, 2 m	axial	Pre-wired (2 m)*	Dark-ON	Non-polarizing, incl. E39-R1
E3F2-R2Z1-E 2M	Retroreflective, 2 m	axial	Pre-wired (2 m)*	Light-ON	Non-polarizing, including reflector
E3F2-R2Z2-E 2M	Retroreflective, 2 m	axial	Pre-wired (2 m)*	Dark-ON	Non-polarizing, including 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 AC Switching Models

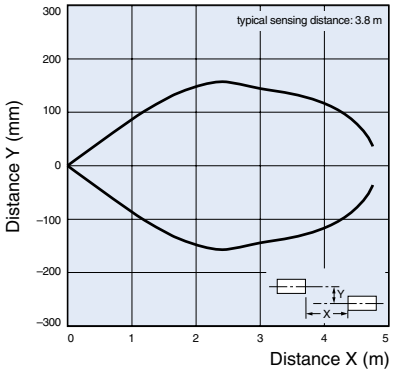
Item	E3F2-3Z1 E3F2-3Z2	E3F2-R2Z1 E3F2-R2Z2	E3F2-DS10Z1 E3F2-DS10Z2
Sensing method	Through-beam	Non-polarizing Retroreflective	Diffuse reflective (wide-beam characteristic)
Power supply voltage	24 to 240 VAC ±10 %, 50 / 60 Hz		
Current consumption	10 mA max.	5 mA max.	
Rated sensing distance [*1]	3 m	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 [*3]	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 min. at 500 V DC between energized parts and case		
Dielectric strength	1500 VAC, 50 / 60 Hz for 1 min between energized 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 [*4]; NEMA 1, 2, 4; IP69k after DIN 40050 part 9		
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) [*5])		
Operation mode	Light-ON or Dark-ON (fixed)		
Circuit protection	None		
Weight (approx.)	110 g (pre-wired 2 m cable)		
Housing materials	Plastic (case: ABS; lens: PMMA)		

[*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]
[*4] The enclosure rating IP67 of OMRON internal standards correspond to stricter test requirements than the standard IEC 60529 (refer to chapter "Precautions")
[*5] For other cable materials (e.g. PUR) please contact your OMRON sales representative.

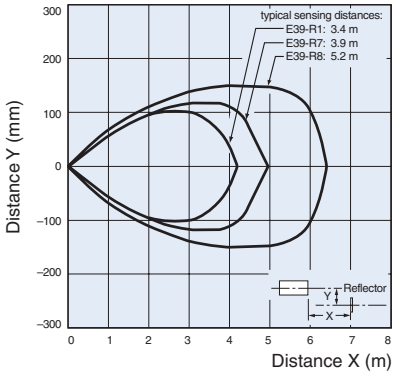
Engineering Data (Typical)

Operating Range (typical)

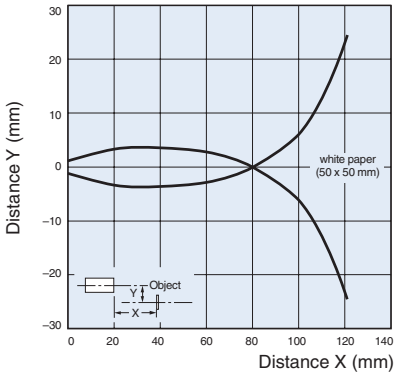
Through-beam Models (axial)
E3F2-3Z□



Retroreflective Models (axial)
E3F2-R2Z□ (non polarizing) and reflectors

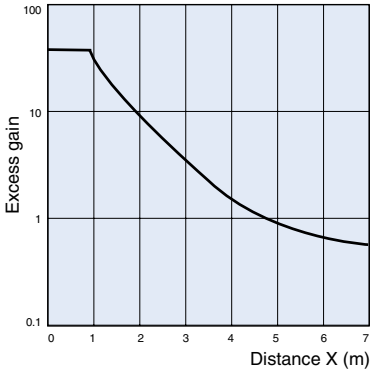


Diffuse reflective Models (axial)
E3F2-DS10Z-□ (wide-beam type)

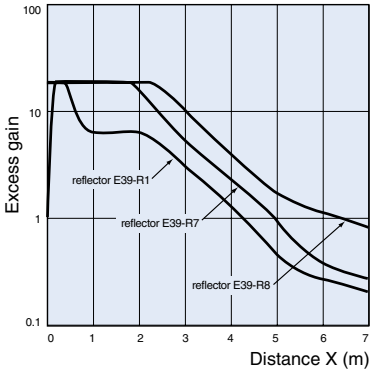


Excess Gain Ratio vs. Distance (typical)

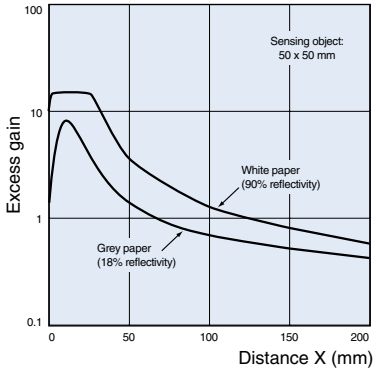
Through-beam Models (axial)
E3F2-3Z□



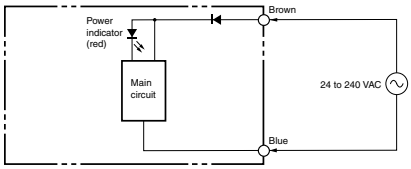
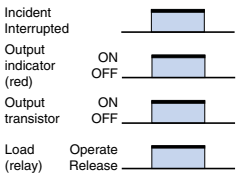
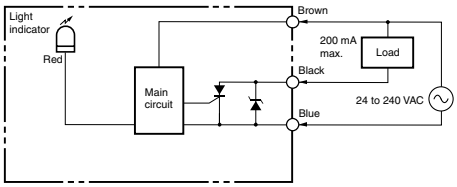
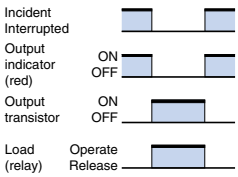
Retroreflective Models (axial)
E3F2-R2Z□ (non polarizing) and reflectors



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

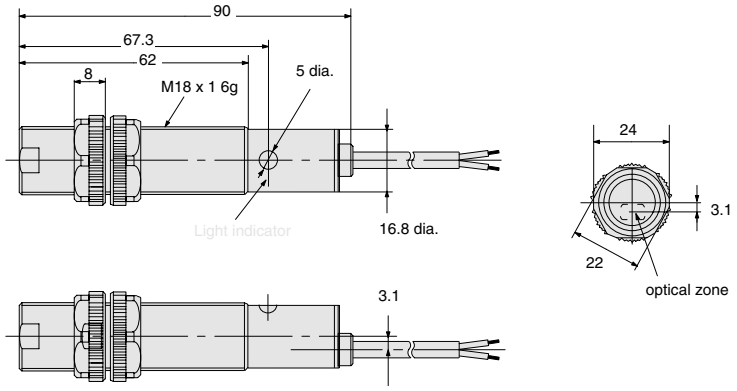


Operation

Model	Output transistor status	Timing chart	Connection method	Output circuit
E3F2-3LZ	–	–	–	Through-beam emitter 
E3F2-3Z1 E3F2-R2Z1 E3F2-DS10Z1-N	ON when light is incident. (Light-ON)		–	
E3F2-3Z2 E3F2-R2Z2 E3F2-DS10Z2-N	ON when light is interrupted. (Dark-ON)		–	

Dimensions

Cable type
Without potentiometer
E3F2-3Z□ **E3F2-R2Z□** **E3F2-DS10Z□-N**



Precautions

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 are checked.

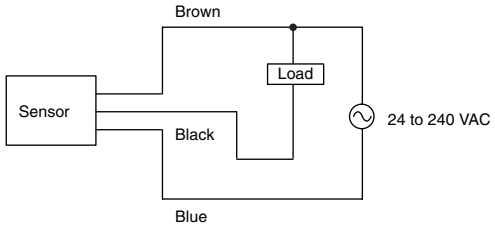
Water proof: The sensors are submerged alternating in water of +2 °C and +55 °C. 20 cycles with 1 hour for each temperature are executed. Function, water tightness and electrical isolation are checked.

Do not expose the photoelectric sensor to excessive shock during installation, keeping within IP 67 standards.

Wiring

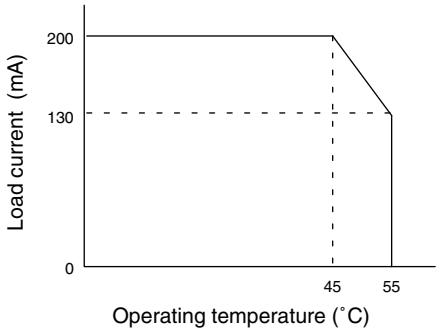
If the input/output lines of the photoelectric sensor are placed in the same conduit or duct as power lines or high-voltage lines, the photoelectric sensor could be induced to malfunction, or even be damaged by electrical noise. Separate the wiring, or use shielded lines as input/output lines to the 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 using the photoelectric sensor in the vicinity of an inverter motor, ensure to connect the protective earth ground wire of the motor to earth. Failure to ground the motor may result in malfunction of the sensor.

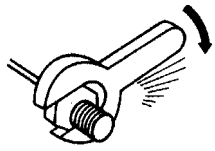
When you use the photoelectric sensor at temperatures exceeding 45 °C, the load current must be within the described values as shown in the figure below.



Installation

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



Cat. No. E43E-EN-01 **In the interest of product improvement, specifications are subject to change without notice.**

OMRON EUROPE B.V.

Wegalaan 67-69,
NL-2132 JD, Hoofddorp,
The Netherlands
Phone: +31 23 568 13 00
Fax: +31 23 568 13 88
www.eu.omron.com