

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

- M18 DIN-sized cylindrical housing
- Housing materials: plastic, nickel-brass, and stainless steel
- Improved degree of protection
- Retroreflective polarized type (2-m MSR: Mirror Surface Rejection): Metal housing type only
- Sensing distance, separate type: 7 m
- Long sensing distance (30 cm) with sensitivity adjuster for diffuse type (DC switching type)
- DC switching type with connectors for easy maintenance
- Full metal plug-in type
- Wide operating voltage range (10 to 30 VDC or 24 to 240 VAC)
- Short-circuit and reverse connection protection (DC switching type)
- UL and CSA approved (AC switching type).
- CE marking



Ordering Information

■ DC-switching Models with Plastic Housing

Operating modes	Connection method	Control output	Sensing method	Sensing distance	Degree of protection	Remarks	Model
---	Pre-wired	N. A.	Through-beam	7 m	IEC60529 IP66	Emitter only	E3F2-7L
Light-ON/ Dark-ON (selectable)	Pre-wired	NPN	Through-beam	7 m	IEC60529 IP66	Receiver only	E3F2-7DC4
	Pre-wired	PNP	Through-beam	7 m	IEC60529 IP66	Receiver only	E3F2-7DB4
	Pre-wired	NPN	Through-beam	7 m	IEC60529 IP66	Receiver and Emitter	E3F2-7C4
	Pre-wired	PNP	Through-beam	7 m	IEC60529 IP66	Receiver and Emitter	E3F2-7B4
Light-ON/ Dark-ON (selectable)	Pre-wired	NPN	Retroreflective	2 m	IEC60529 IP66	Non-polarized	E3F2-R2C4
Light-ON/ Dark-ON (selectable)	Pre-wired	PNP	Retroreflective	2 m	IEC60529 IP66	Non-polarized	E3F2-R2B4
	Pre-wired	NPN	Retroreflective	2 m	IEC60529 IP66	Non-polarized	E3F2-R2C4-E ^{*1}
	Pre-wired	PNP	Retroreflective	2 m	IEC60529 IP66	Non-polarized	E3F2-R2B4-E ^{*1}
Light-ON/ Dark-ON (selectable)	Pre-wired	NPN	Diffuse reflective	0.1 m	IEC60529 IP66	Wide beam	E3F2-DS10C4-N ^{*2}
Light-ON/ Dark-ON (selectable)	Pre-wired	PNP	Diffuse reflective	0.1 m	IEC60529 IP66	Wide beam	E3F2-DS10B4-N ^{*2}
Light-ON/ Dark-ON (selectable)	Pre-wired	NPN	Diffuse reflective	0.3 m	IEC60529 IP66	Sensitivity adjustor	E3F2-DS30C4
Light-ON/ Dark-ON (selectable)	Pre-wired	PNP	Diffuse reflective	0.3 m	IEC60529 IP66	Sensitivity adjustor	E3F2-DS30B4
---	Connector	N. A.	Through-beam	7 m	IEC60529 IP66	Emitter only	E3F2-7L-P1
Light-ON/ Dark-ON (selectable)	Connector	NPN	Through-beam	7 m	IEC60529 IP66	Receiver only	E3F2-7DC4-P1
	Connector	PNP	Through-beam	7 m	IEC60529 IP66	Receiver only	E3F2-7DB4-P1
	Connector	NPN	Through-beam	7 m	IEC60529 IP66	Receiver and Emitter	E3F2-7C4-P1
Light-ON/ Dark-ON (selectable)	Connector	PNP	Through-beam	7 m	IEC60529 IP66	Receiver and Emitter	E3F2-7B4-P1
Light-ON/ Dark-ON (selectable)	Connector	NPN	Retroreflective	2 m	IEC60529 IP66	Non-polarized	E3F2-R2C4-P1
Light-ON/ Dark-ON (selectable)	Connector	PNP	Retroreflective	2 m	IEC60529 IP66	Non-polarized	E3F2-R2B4-P1
	Connector	NPN	Retroreflective	2 m	IEC60529 IP66	Non-polarized	E3F2-R2C4-P1-E ^{*1}
	Connector	PNP	Retroreflective	2 m	IEC60529 IP66	Non-polarized	E3F2-R2B4-P1-E ^{*1}
Light-ON/ Dark-ON (selectable)	Connector	NPN	Diffuse reflective	0.1 m	IEC60529 IP66	Wide beam	E3F2-DS10C4-P1 ^{*2}
Light-ON/ Dark-ON (selectable)	Connector	PNP	Diffuse reflective	0.1 m	IEC60529 IP66	Wide beam	E3F2-DS10B4-P1 ^{*2}
Light-ON/ Dark-ON (selectable)	Connector	NPN	Diffuse reflective	0.3 m	IEC60529 IP66	Sensitivity adjustor	E3F2-DS30C4-P1
Light-ON/ Dark-ON (selectable)	Connector	PNP	Diffuse reflective	0.3 m	IEC60529 IP66	Sensitivity adjustor	E3F2-DS30B4-P1

Note: NPN: Transistor output, NPN open collector

PNP: Transistor output, PNP open collector

^{*1} Model numbers ending with the suffix "-E" are models without the E39-R1 Retroreflector.

^{*2} All diffuse-reflective DS10 models have wide-beam characteristics.

■ DC-switching Models with Metal Housing

Nickel-brass Housing Models

Operating mode	Connection method	Control output	Sensing method	Sensing distance	Degree of protection	Remarks	Model
---	Pre-wired	N. A.	Through-beam	7 m	IEC60529 IP66	Emitter only	E3F2-7L-M
Light-ON/ Dark-ON (selectable)	Pre-wired	NPN	Through-beam	7 m	IEC60529 IP66	Receiver only	E3F2-7DC4-M
	Pre-wired	PNP	Through-beam	7 m	IEC60529 IP66	Receiver only	E3F2-7DB4-M
	Pre-wired	NPN	Through-beam	7 m	IEC60529 IP66	Receiver and Emitter	E3F2-7C4-M ^{*2}
	Pre-wired	PNP	Through-beam	7 m	IEC60529 IP66	Receiver and Emitter	E3F2-7B4-M ^{*2}
Light-ON/ Dark-ON (selectable)	Pre-wired	NPN	Retroreflective	2 m	IEC60529 IP66	Polarized	E3F2-R2RC4-M ^{*2}
Light-ON/ Dark-ON (selectable)	Pre-wired	PNP	Retroreflective	2 m	IEC60529 IP66	Polarized	E3F2-R2RB4-M ^{*2}
	Pre-wired	NPN	Retroreflective	2 m	IEC60529 IP66	Polarized	E3F2-R2RC4-M-E ^{*1}
	Pre-wired	PNP	Retroreflective	2 m	IEC60529 IP66	Polarized	E3F2-R2RB4-M-E ^{*1}
Light-ON/ Dark-ON (selectable)	Pre-wired	NPN	Diffuse reflective	0.1 m	IEC60529 IP66	Wide beam	E3F2-DS10C4-M ^{*2}
Light-ON/ Dark-ON (selectable)	Pre-wired	PNP	Diffuse reflective	0.1 m	IEC60529 IP66	Wide beam	E3F2-DS10B4-M ^{*2}
Light-ON/ Dark-ON (selectable)	Pre-wired	NPN	Diffuse reflective	0.3 m	IEC60529 IP66	Sensitivity adjustor	E3F2-DS30C4-M ^{*2}
Light-ON/ Dark-ON (selectable)	Pre-wired	PNP	Diffuse reflective	0.3 m	IEC60529 IP66	Sensitivity adjustor	E3F2-DS30B4-M ^{*2}
---	Connector	N. A.	Through-beam	7 m	IEC60529 IP66	Emitter only	E3F2-7L-M1-M
Light-ON/ Dark-ON (selectable)	Connector	NPN	Through-beam	7 m	IEC60529 IP66	Receiver only	E3F2-7DC4-M1-M
	Connector	PNP	Through-beam	7 m	IEC60529 IP66	Receiver only	E3F2-7DB4-M1-M
	Connector	NPN	Through-beam	7 m	IEC60529 IP66	Receiver and Emitter	E3F2-7C4-M1-M ^{*2}
Light-ON/ Dark-ON (selectable)	Connector	PNP	Through-beam	7 m	IEC60529 IP66	Receiver and Emitter	E3F2-7B4-M1-M ^{*2}
Light-ON/ Dark-ON (selectable)	Connector	NPN	Retroreflective	2 m	IEC60529 IP66	Polarized	E3F2-R2RC4-M1-M ^{*2}
Light-ON/ Dark-ON (selectable)	Connector	PNP	Retroreflective	2 m	IEC60529 IP66	Polarized	E3F2-R2RB4-M1-M ^{*2}
	Connector	NPN	Retroreflective	2 m	IEC60529 IP66	Polarized	E3F2-R2RC4-M1-M-E ^{*1}
	Connector	PNP	Retroreflective	2 m	IEC60529 IP66	Polarized	E3F2-R2RB4-M1-M-E ^{*1}
Light-ON/ Dark-ON (selectable)	Connector	NPN	Diffuse reflective	0.1 m	IEC60529 IP66	Wide beam	E3F2-DS10C4-M1-M ^{*2}
Light-ON/ Dark-ON (selectable)	Connector	PNP	Diffuse reflective	0.1 m	IEC60529 IP66	Wide beam	E3F2-DS10B4-M1-M ^{*2}
Light-ON/ Dark-ON (selectable)	Connector	NPN	Diffuse reflective	0.3 m	IEC60529 IP66	Sensitivity adjustor	E3F2-DS30C4-M1-M ^{*2}
Light-ON/ Dark-ON (selectable)	Connector	PNP	Diffuse reflective	0.3 m	IEC60529 IP66	Sensitivity adjustor	E3F2-DS30B4-M1-M ^{*2}
---	Pre-wired	N. A.	Through-beam	7 m	IEC60529 IP67	Emitter only	E3F2-7L-C
Light-ON/ Dark-ON (selectable)	Pre-wired	NPN	Through-beam	7 m	IEC60529 IP67	Receiver only	E3F2-7DC4-C
	Pre-wired	PNP	Through-beam	7 m	IEC60529 IP67	Receiver only	E3F2-7DB4-C
	Pre-wired	NPN	Through-beam	7 m	IEC60529 IP67	Receiver and Emitter	E3F2-7C4-C ^{*2}

Operating mode	Connection method	Control output	Sensing method	Sensing distance	Degree of protection	Remarks	Model
Light-ON/ Dark-ON (selectable)	Pre-wired	PNP	Through-beam	7 m	IEC60529 IP67	Receiver and Emitter	E3F2-7B4-C* ²
Light-ON/ Dark-ON (selectable)	Pre-wired	NPN	Retroreflective	2 m	IEC60529 IP67	Polarized	E3F2-R2RC4-C* ²
Light-ON/ Dark-ON (selectable)	Pre-wired	PNP	Retroreflective	2 m	IEC60529 IP67	Polarized	E3F2-R2RB4-C* ²
	Pre-wired	NPN	Retroreflective	2 m	IEC60529 IP67	Polarized	E3F2-R2RC4-C-E* ¹
	Pre-wired	PNP	Retroreflective	2 m	IEC60529 IP67	Polarized	E3F2-R2RB4-C-E* ¹
Light-ON/ Dark-ON (selectable)	Pre-wired	NPN	Diffuse reflective	0.1 m	IEC60529 IP67	Wide beam	E3F2-DS10C4-C* ²
Light-ON/ Dark-ON (selectable)	Pre-wired	PNP	Diffuse reflective	0.1 m	IEC60529 IP67	Wide beam	E3F2-DS10B4-C* ²
---	Connector	N. A.	Through-beam	7 m	IEC60529 IP67	Emitter only	E3F2-7L-M1-C
Light-ON/ Dark-ON (selectable)	Connector	NPN	Through-beam	7 m	IEC60529 IP67	Receiver only	E3F2-7DC4-M1-C
	Connector	PNP	Through-beam	7 m	IEC60529 IP67	Receiver only	E3F2-7DB4-M1-C
	Connector	NPN	Through-beam	7 m	IEC60529 IP67	Receiver and Emitter	E3F2-7C4-M1-C* ²
	Connector	PNP	Through-beam	7 m	IEC60529 IP67	Receiver and Emitter	E3F2-7B4-M1-C* ²
Light-ON/ Dark-ON (selectable)	Connector	NPN	Retroreflective	2 m	IEC60529 IP67	Polarized	E3F2-R2RC4-M1-C* ²
Light-ON/ Dark-ON (selectable)	Connector	PNP	Retroreflective	2 m	IEC60529 IP67	Polarized	E3F2-R2RB4-M1-C* ²
	Connector	NPN	Retroreflective	2 m	IEC60529 IP67	Polarized	E3F2-R2RC4-M1-C-E* ¹
	Connector	PNP	Retroreflective	2 m	IEC60529 IP67	Polarized	E3F2-R2RB4-M1-C-E* ¹
Light-ON/ Dark-ON (selectable)	Connector	NPN	Diffuse reflective	0.1 m	IEC60529 IP67	Wide beam	E3F2-DS10C4-M1-C* ²
Light-ON/ Dark-ON (selectable)	Connector	PNP	Diffuse reflective	0.1 m	IEC60529 IP67	Wide beam	E3F2-DS10B4-M1-C* ²

Note: All diffuse-reflective DS10 models have wide-beam characteristics.

(-E) *¹ Model numbers ending with the suffix "-E" are models without the E39-R1 Retroreflector.

(-M) *² Special models for harsh environments are available to satisfy the higher degree of protection IP67. These models are available in nickel-brass (replace "-M" with "-C") or stainless steel (replace "-M" with "-S"), except for 0.3-m diffuse-reflective models.

■ Stainless Housing Models

Operating modes	Connection method	Control output	Sensing method	Sensing distance	Degree of protection	Remarks	Model
---	Pre-wired	N. A.	Through-beam	7 m	IEC60529 IP67	Emitter only	E3F2-7L-S
Light-ON/ Dark-ON (selectable)	Pre-wired	NPN	Through-beam	7 m	IEC60529 IP67	Receiver only	E3F2-7DC4-S
	Pre-wired	PNP	Through-beam	7 m	IEC60529 IP67	Receiver only	E3F2-7DB4-S
	Pre-wired	NPN	Through-beam	7 m	IEC60529 IP67	Receiver and Emitter	E3F2-7C4-S
	Pre-wired	PNP	Through-beam	7 m	IEC60529 IP67	Receiver and Emitter	E3F2-7B4-S
Light-ON/ Dark-ON (selectable)	Pre-wired	NPN	Retroreflective	2 m	IEC60529 IP67	Polarized	E3F2-R2RC4-S
Light-ON/ Dark-ON (selectable)	Pre-wired	PNP	Retroreflective	2 m	IEC60529 IP67	Polarized	E3F2-R2RB4-S
	Pre-wired	NPN	Retroreflective	2 m	IEC60529 IP67	Polarized	E3F2-R2RC4-S-E* ¹
	Pre-wired	PNP	Retroreflective	2 m	IEC60529 IP67	Polarized	E3F2-R2RB4-S-E* ¹
Light-ON/ Dark-ON (selectable)	Pre-wired	NPN	Diffuse reflective	0.1 m	IEC60529 IP67	Wide beam	E3F2-DS10C4-S

Operating modes	Connection method	Control output	Sensing method	Sensing distance	Degree of protection	Remarks	Model
Light-ON/ Dark-ON (selectable)	Pre-wired	PNP	Diffuse reflective	0.1 m	IEC60529 IP67	Wide beam	E3F2-DS10B4-S
Light-ON/ Dark-ON (selectable)	Pre-wired	NPN	Diffuse reflective	0.3 m	IEC60529 IP66	Sensitivity adjustor	E3F2-DS30C4-S
Light-ON/ Dark-ON (selectable)	Pre-wired	PNP	Diffuse reflective	0.3 m	IEC60529 IP66	Sensitivity adjustor	E3F2-DS30B4-S
---	Connector	N. A.	Through-beam	7 m	IEC60529 IP67	Emitter only	E3F2-7L-M1-S
Light-ON/ Dark-ON (selectable)	Connector	NPN	Through-beam	7 m	IEC60529 IP67	Receiver only	E3F2-7DC4-M1-S
	Connector	PNP	Through-beam	7 m	IEC60529 IP67	Receiver only	E3F2-7DB4-M1-S
	Connector	NPN	Through-beam	7 m	IEC60529 IP67	Receiver and Emitter	E3F2-7C4-M1-S
Light-ON/ Dark-ON (selectable)	Connector	PNP	Through-beam	7 m	IEC60529 IP67	Receiver and Emitter	E3F2-7B4-M1-S
Light-ON/ Dark-ON (selectable)	Connector	NPN	Retroreflective	2 m	IEC60529 IP67	Polarized	E3F2-R2RC4-M1-S
Light-ON/ Dark-ON (selectable)	Connector	PNP	Retroreflective	2 m	IEC60529 IP67	Polarized	E3F2-R2RB4-M1-S
Light-ON/ Dark-ON (selectable)	Connector	NPN	Retroreflective	2 m	IEC60529 IP67	Polarized	E3F2-R2RC4-M1-S-E ^{*1}
	Connector	PNP	Retroreflective	2 m	IEC60529 IP67	Polarized	E3F2-R2RB4-M1-S-E ^{*1}
	Connector	NPN	Diffuse reflective	0.1 m	IEC60529 IP67	Wide beam	E3F2-DS10C4-M1-S
Light-ON/ Dark-ON (selectable)	Connector	PNP	Diffuse reflective	0.1 m	IEC60529 IP67	Wide beam	E3F2-DS10B4-M1-S
Light-ON/ Dark-ON (selectable)	Connector	NPN	Diffuse reflective	0.3 m	IEC60529 IP67	Sensitivity adjustor	E3F2-DS30C4-M1-S
Light-ON/ Dark-ON (selectable)	Connector	PNP	Diffuse reflective	0.3 m	IEC60529 IP67	Sensitivity adjustor	E3F2-DS30B4-M1-S

- Note:**
1. Material specification for stainless-steel housing case: 1,4305 (DIN), 303 (ANSI). Other material specifications are available upon request.
 2. All-stainless-steel models for harsh environments are available to satisfy the higher degree of protection IP67, except for 0.3-m diffuse-reflective models.
(-E) ^{*1} Model numbers ending with the suffix "-E" are models without the E39-R1 Retroreflector.

■ AC-switching Models with Plastic Housing

Operating modes	Connection method	Control output	Sensing method	Sensing distance	Degree of protection	Remarks	Model
---	Pre-wired	---	Through-beam	3 m	IEC60529 IP66	Emitter only	E3F2-3LZ
L-ON	Pre-wired	AC solid state (SCR)	Through-beam	3 m	IEC60529 IP66	Receiver only	E3F2-3DZ1
D-ON	Pre-wired	AC solid state (SCR)	Through-beam	3 m	IEC60529 IP66	Receiver only	E3F2-3DZ2
L-ON	Pre-wired	AC solid state (SCR)	Through-beam	3 m	IEC60529 IP66	Receiver and Emitter	E3F2-3Z1
D-ON	Pre-wired	AC solid state (SCR)	Through-beam	3 m	IEC60529 IP66	Receiver and Emitter	E3F2-3Z2
L-ON	Pre-wired	AC solid state (SCR)	Retroreflective	2 m	IEC60529 IP66	Non polarized	E3F2-R2Z1
D-ON	Pre-wired	AC solid state (SCR)	Retroreflective	2 m	IEC60529 IP66	Non-polarized	E3F2-R2Z2
L-ON	Pre-wired	AC solid state (SCR)	Retroreflective	2 m	IEC60529 IP66	Non-polarized	E3F2-R2Z1-E ^{*1}
D-ON	Pre-wired	AC solid state (SCR)	Retroreflective	2 m	IEC60529 IP66	Non-polarized	E3F2-R2Z2-E ^{*1}
L-ON	Pre-wired	AC solid state (SCR)	Diffuse reflective	0.1 m	IEC60529 IP66	Wide beam	E3F2-DS10Z1-N ^{*2}
D-ON	Pre-wired	AC solid state (SCR)	Diffuse reflective	0.1 m	IEC60529 IP66	Wide beam	E3F2-DS10Z2-N ^{*2}

Note: L-ON: Light-ON (Fixed)

D-ON: Dark-ON (Fixed)

^{*1} Model numbers ending with the suffix "-E" are models without the E39-R1 Retroreflector.

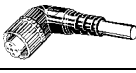
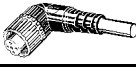
^{*2} All diffuse-reflective DS10 models have wide-beam characteristics.

■ Accessories (Order Separately)

Name	Model
Retroreflector	E39-R1, E39-R3
Retroreflector (tape type)	E39-RSA, E39-RSB
Lens Cap	E39-F31
Mounting Bracket	Y92E-B18

■ Connector

Plugs (Order Separately)

Cable	Appearance		Cable length	Model
Standard	Straight (4 conductor)		2 m	XS2F-D421-D80-A
			5 m	XS2F-D421-G80-A
	L-shape (4 conductor)		2 m	XS2F-D422-D80-A
			5 m	XS2F-D422-G80-A
Robot (vibration-proof)	Straight (4 conductor)		2 m	XS2F-D421-D80-R
			5 m	XS2F-D421-G80-R
	L-shape (4 conductor)		2 m	XS2F-D422-D80-R
			5 m	XS2F-D422-G80-R

Specifications

DC Switching Models

Item	E3F2-7C4-□, E3F2-7B4-□	E3F2-R2C4-□, E3F2-R2B4-□	E3F2-R2RC4-□, E3F2-R2RB4-□	E3F2-DS10C4-□, E3F2-DS10B4-□	E3F2-DS30C4-□, E3F2-DS30B4-□
	Through-beam	Retroreflective		Diffuse reflective	
		Non-polarized	Polarized		
Power supply voltage	10 to 30 VDC				
Current consumption	45 mA max.	25 mA max.			
Sensing distance (See note 1.)	7 m	2 m	2 m (MSR)	0.1 m	0.3 m
Response time	2.5 ms				
Control output	Transistor (open collector) 100 mA max.; residual voltage: 2 V max. at 100 mA				
Power reset time	50 ms				
Ambient illumination (See note 2.)	Incandescent lamp: 3,000 lx max. Sunlight: 10,000 lx max.				
Ambient temperature	Operating: −25°C to 55°C (with no icing) Storage: −30°C to 70°C				
Ambient humidity	Operating: 35% to 85% (with no condensation) Storage: 35% to 95%				
Insulation resistance	20 MΩ (at 500 VDC)				
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between current carry parts and case				
Vibration resistance	10 to 55 Hz, 1.5-mm double amplitude for 1 hr each in X, Y, Z directions				
Shock resistance	500 m/s ² (approx. 50G)				
Degree of protection	IEC60529 IP66 for plastic and nickel-brass housing type IEC60529 IP67 for stainless-steel housing, optional for nickel-brass housing type				IEC60529 IP66
Light source	Infrared LED		Red LED	Infrared LED	
Indicators	Light incident/power indicator for emitter (through-beam models) (red)				
Sensitivity adjustment	Fixed				Adjustable
Connection method	2-m pre-wired cable or connector				
Operation mode	Light-ON or Dark-ON selectable with wiring				
Weight Plastic case Metal case	Pre-wired cable models: Approx. 85 g Approx. 100 g		Connector models: Approx. 40 g Approx. 60 g		
Circuit protection	Output short-circuit and power supply reverse polarity				
Housing materials	Plastic Nickel-brass Stainless steel	Plastic	Nickel-brass Stainless steel	Plastic Nickel-brass Stainless steel	Plastic Nickel-brass Stainless steel

- Note:**
1. Per actual stable sensing distance, for details, see the *Gain vs. Set Distance* ratios in the *Engineering Data*.
 2. The intensity of the illumination on the surface of the receiver with a 20% fluctuation of the optical output per 200 lx. This is not the maximum available operating illumination.

AC Switching Models

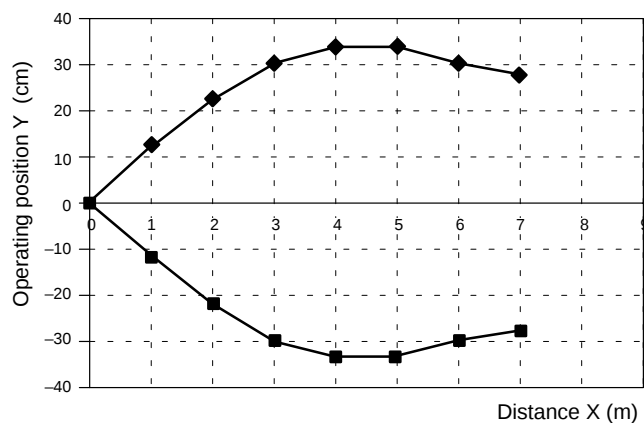
Item	E3F2-3Z1, E3F2-3Z2	E3F2-R2Z1, E3F2-R2Z2	E3F2-DS10Z1, E3F2-DS10Z2
	Through-beam	Retroreflective	Diffuse reflective
Power supply voltage	24 to 240 VAC $\pm 10\%$, 50/60 Hz		
Current consumption	10 mA max.	5 mA max.	
Sensing distance (see note 1)	3 m	0.1 to 2 m (E39-R1 Reflector)	0.1 m (5 $\times$ 5 cm white paper)
Sensing object	Opaque: 11 mm min.	Opaque: 56 mm min.	Opaque
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 (see note 3)		
Power reset time	100 ms		
Ambient illumination (see note 2)	Incandescent lamp: 3,000 μ x max. Sunlight: 10,000 μ x max.		
Ambient temperature	Operating: -25°C to 55°C (with no icing) Storage: -30°C to 70°C (with no icing)		
Ambient humidity	Operating: 35% to 85% Storage: 35% to 95% (with no condensation)		
Insulation resistance	20 M Ω (at 500 VDC) between current carry parts and case		
Dielectric strength	1,500 VAC, 50/60 Hz for 1 min between current carry parts and case		
Vibration resistance	10 to 55 Hz, 1.5-mm double amplitude for 2 hrs each in X, Y, Z directions		
Shock resistance	500 m/s ² (approx. 50G)		
Degree of protection	IEC60529 IP66, NEMA 1, 2, 4 (indoor)		
Light source	Infrared		
Indicators	Light incident/power indicator for light source (red)		
Sensitivity adjustment	Fixed		
Connection method	2-m pre-wired cable		
Operation mode	Light-ON or Dark-ON (fixed)		
Circuit protection	---		
Weight	Pre-wired models: Approx. 110 g Connector models: Approx. 55 g		
Housing materials	Case: ABS Lens: Acrylate resin		

- Note:**
1. Per actual stable sensing distance, for details, see the *Gain vs. Set Distance* ratios in the *Engineering Data*.
 2. The intensity of the illumination on the surface of the receiver with a 20% fluctuation of the optical output per 200 μ x. This is not the maximum available operating illumination.
 3. When you use the Photoelectric Sensor at the temperature over 45°C , the load current must be within rated value. Please refer to the *Precautions*.

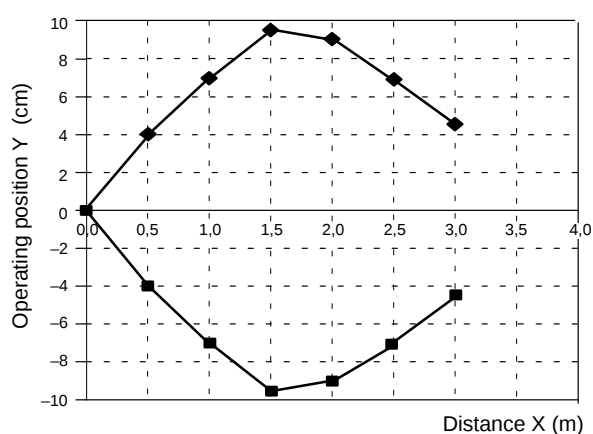
Engineering Data

Operating Range (Typical)

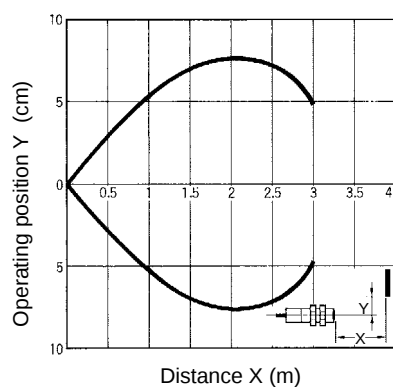
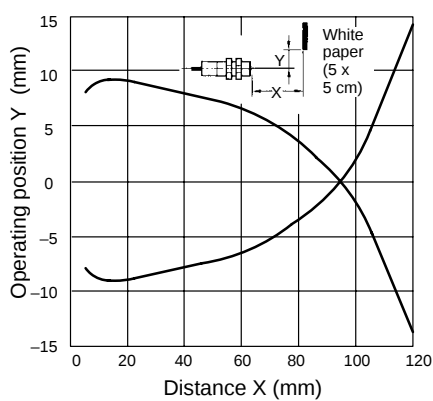
E3F2-7□-4□ (Through-beam)



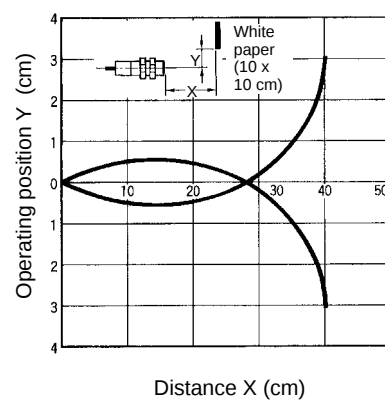
E3F2-R2R□-4□ (Retroreflective, polarized)



E3F2-R2□-4□ (Retroreflective)

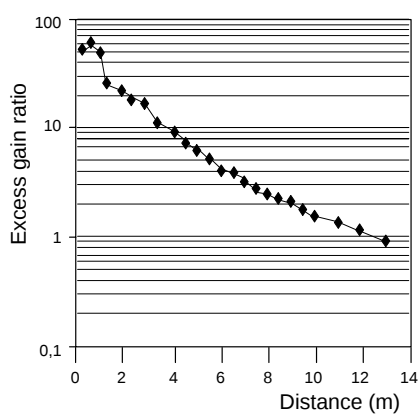
E3F2-DS10□-4-N
E3F2-DS10□-4-P1

E3F2-DS30□-4□

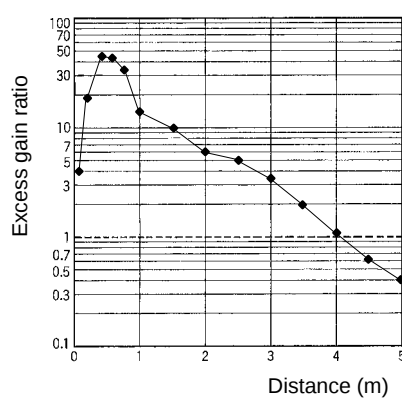


Excess Gain vs. Set Distance (Typical)

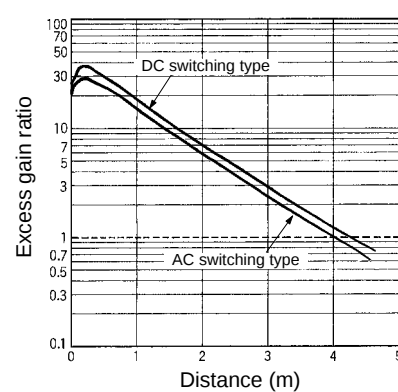
E3F2-7□-4□



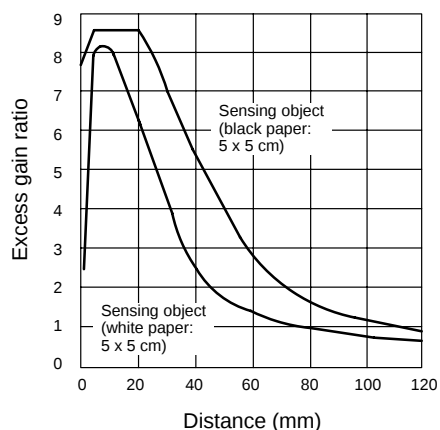
E3F2-R2R□-4□



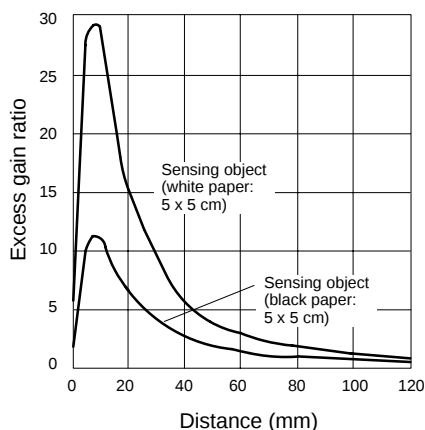
E3F2-R2□-4



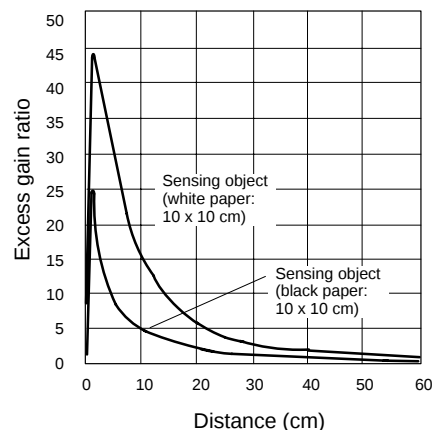
E3F2-DS10Z□-N



E3F2-DS10□4-N



E3F2-DS30□4



Operation

■ Output Circuits

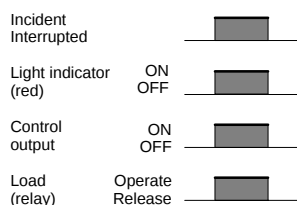
Configuration	Model	Connection method	Output transistor	Output circuit
NPN pre-wired	E3F2-7C4 E3F2-7C4-M E3F2-7C4-C E3F2-7C4-S E3F2-R2C4 E3F2-R2RC4-M E3F2-R2RC4-C E3F2-R2RC4-S E3F2-DS10C4-N E3F2-DS10C4-M E3F2-DS10C4-C E3F2-DS10C4-S E3F2-DS30C4 E3F2-DS30C4-M E3F2-DS30C4-S	Connect the pink and brown wires or open the pink wire.	ON when light is incident. (Light-ON)	
		Connect the pink and blue wires.	ON when light is interrupted. (Dark-ON)	
PNP pre-wired	E3F2-7B4 E3F2-7B4-M E3F2-7B4-C E3F2-7B4-S E3F2-R2B4 E3F2-R2RB4-M E3F2-R2RB4-C E3F2-R2RB4-S E3F2-DS10B4-N E3F2-DS10B4-M E3F2-DS10B4-C E3F2-DS10B4-S E3F2-DS30B4 E3F2-DS30B4-M E3F2-DS30B4-S	Connect the pink and brown wires or open the pink wire.	ON when light is incident. (Light-ON)	
		Connect the pink and blue wires.	ON when light is interrupted. (Dark-ON)	

Configuration	Model	Connection method	Output transistor	Output circuit
NPN connector	E3F2-7C4-P1 E3F2-7C4-M1-M E3F2-7C4-M1-C E3F2-R2C4-P1 E3F2-R2RC4-M1-M E3F2-R2RC4-M1-C E3F2-R2RC4-M1-S E3F2-DS10C4-P1 E3F2-DS10C4-M1-M E3F2-DS10C4-M1-C E3F2-DS10C4-M1-S E3F2-DS30C4-P1 E3F2-DS30C4-M1-M E3F2-DS30C4-M1-S	Connect the pink and brown wires or open the pink wire.	ON when light is incident. (Light-ON)	
		Connect the pink and blue wires.	ON when light is interrupted. (Dark-ON)	
PNP connector	E3F2-7B4-P1 E3F2-7B4-M1-M E3F2-7B4-M1-C E3F2-R2B4-P1 E3F2-R2RB4-M1-M E3F2-R2RB4-M1-C E3F2-R2RB4-M1-S E3F2-DS10B4-P1 E3F2-DS10B4-M1-M E3F2-DS10B4-M1-C E3F2-DS10B4-M1-S E3F2-DS30B4-P1 E3F2-DS30B4-M1-M E3F2-DS30B4-M1-S	Connect the pink and brown wires or open the pink wire.	ON when light is incident. (Light-ON)	
		Connect the pink and blue wires.	ON when light is interrupted. (Dark-ON)	
AC switching	E3F2-3Z1 E3F2-R2Z1 E3F2-DS10Z1-N E3F2-3Z2 E3F2-R2Z2 E3F2-DS10Z2-N	--- (Fixed)	ON when light is incident. (Light-ON) ON when light is interrupted. (Dark-ON)	

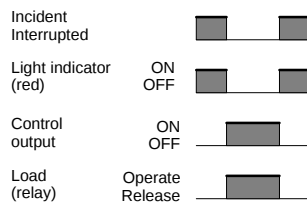
Note: Terminals No. for Connector type.

Timing Chart

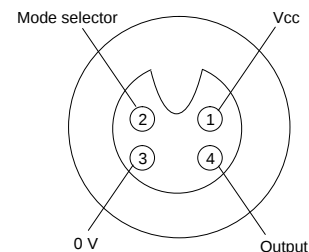
Light-ON Mode



Dark-ON Mode



Terminals/Connections

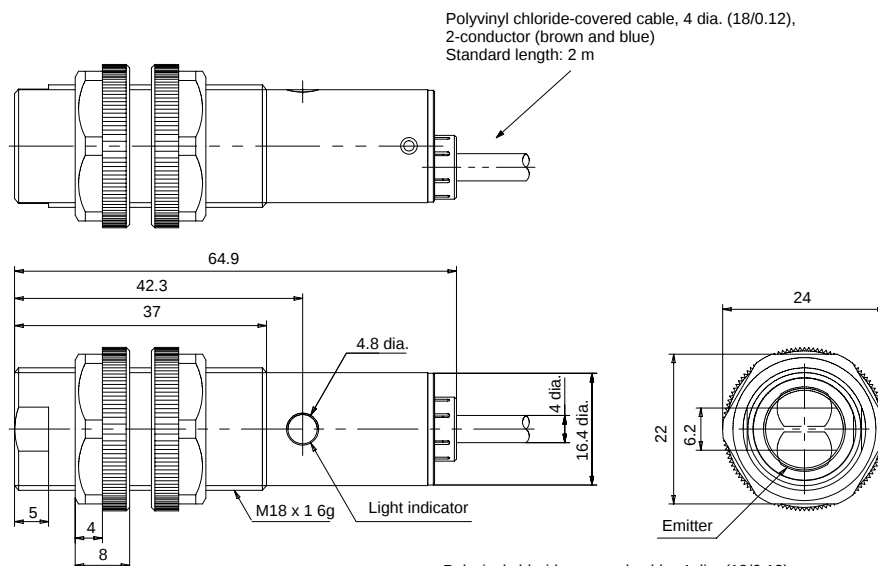


Dimensions

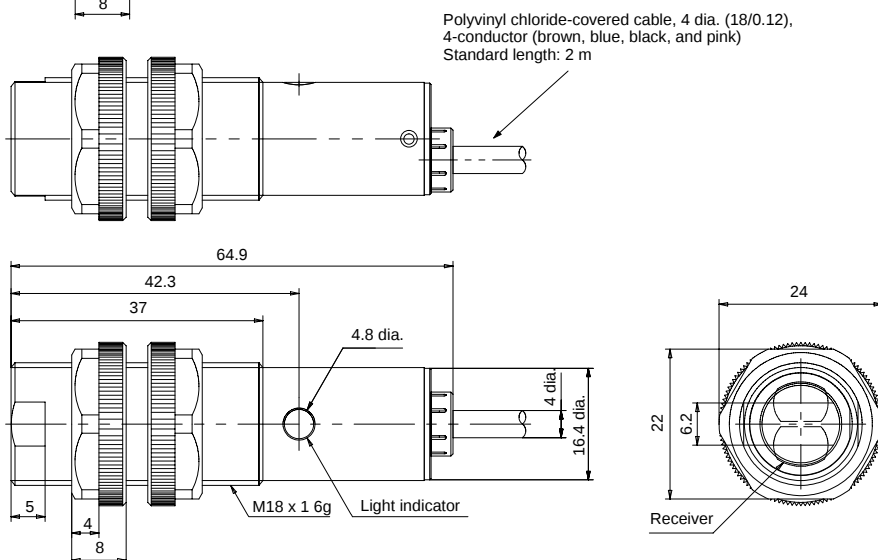
Note: All units are in millimeters unless otherwise indicated.

DC Switching Models

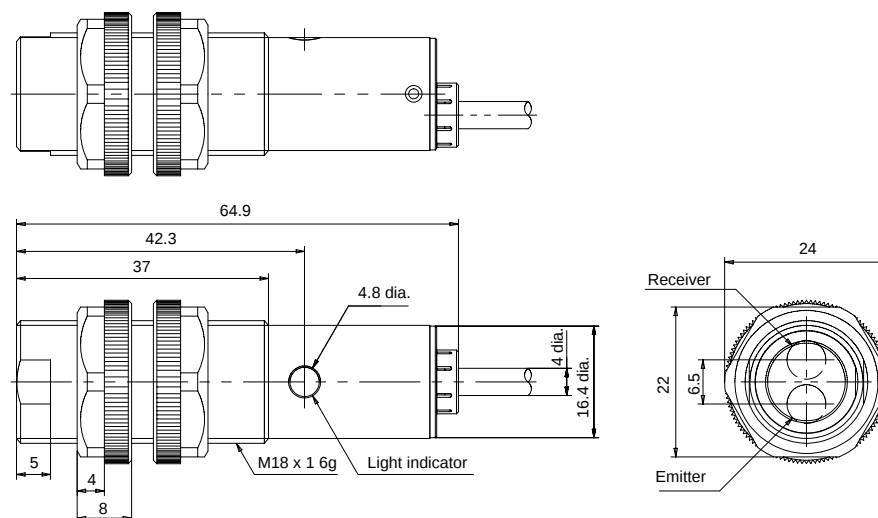
E3F2-7L



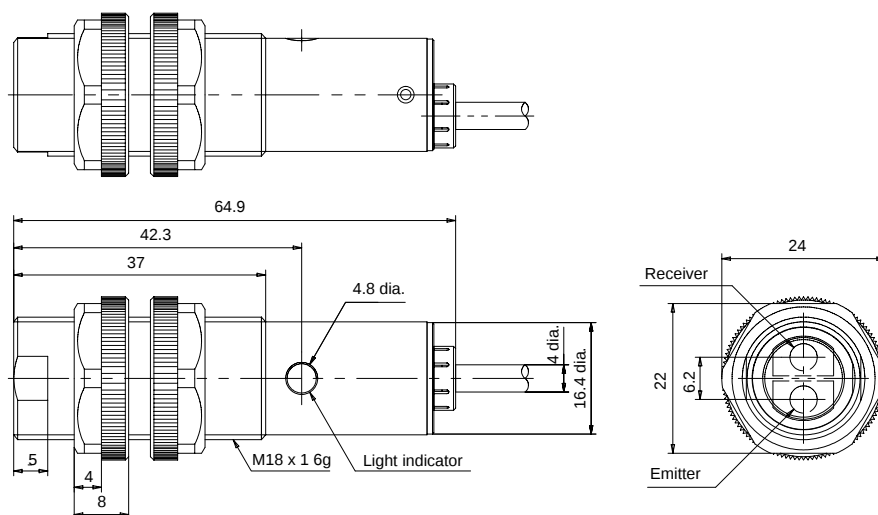
E3F2-7D□4



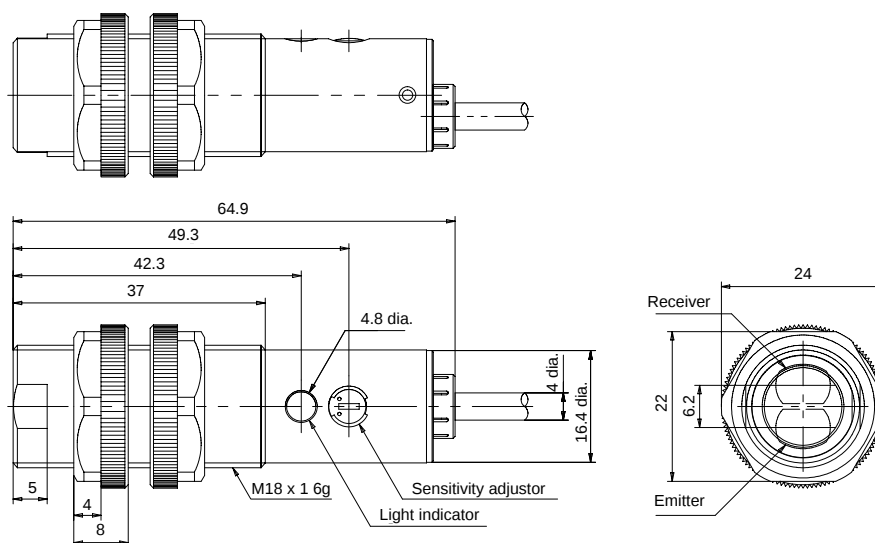
E3F2-R2□4



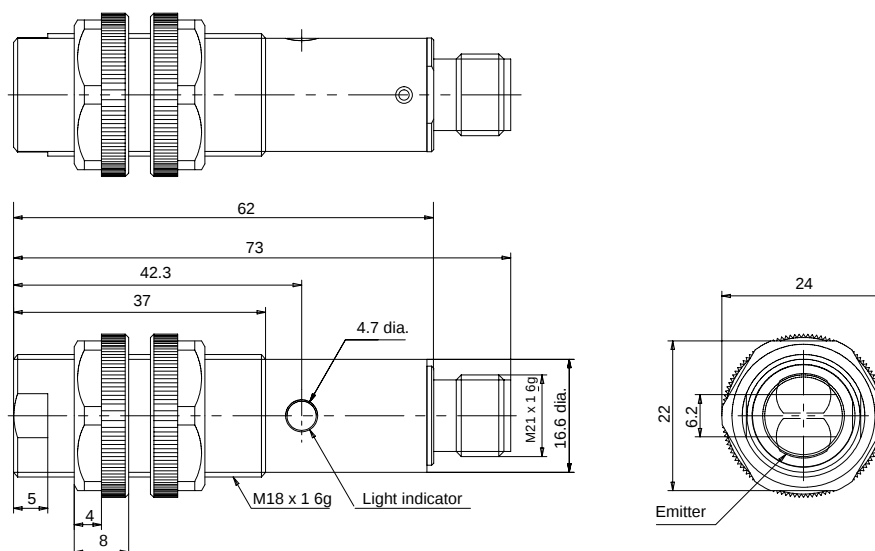
E3F2-DS10□4-N



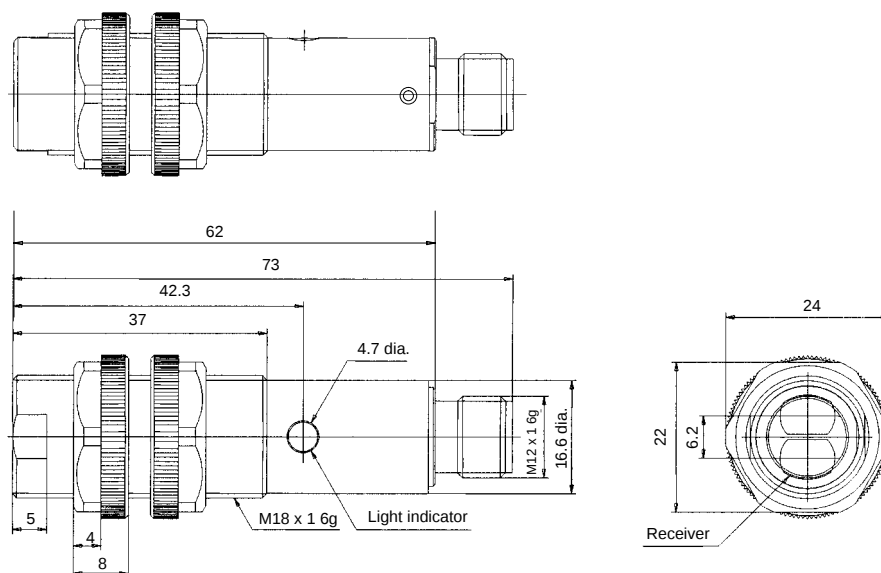
E3F2-DS30□4



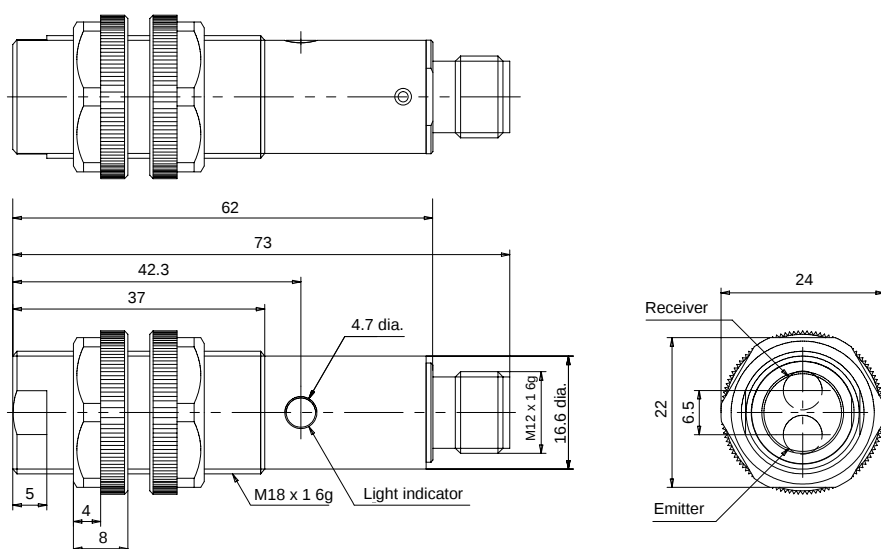
E3F2-7L-P1



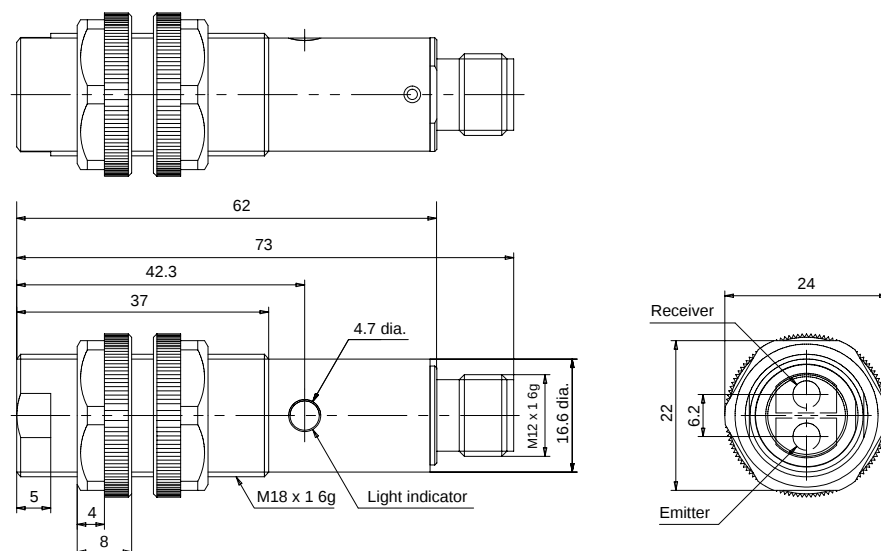
E3F2-7D□4-P1



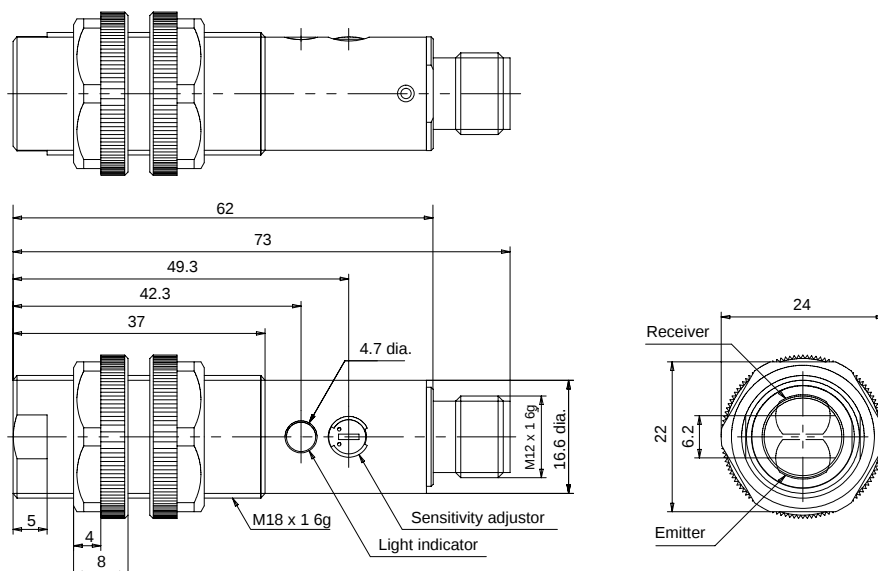
E3F2-R2□4-P1



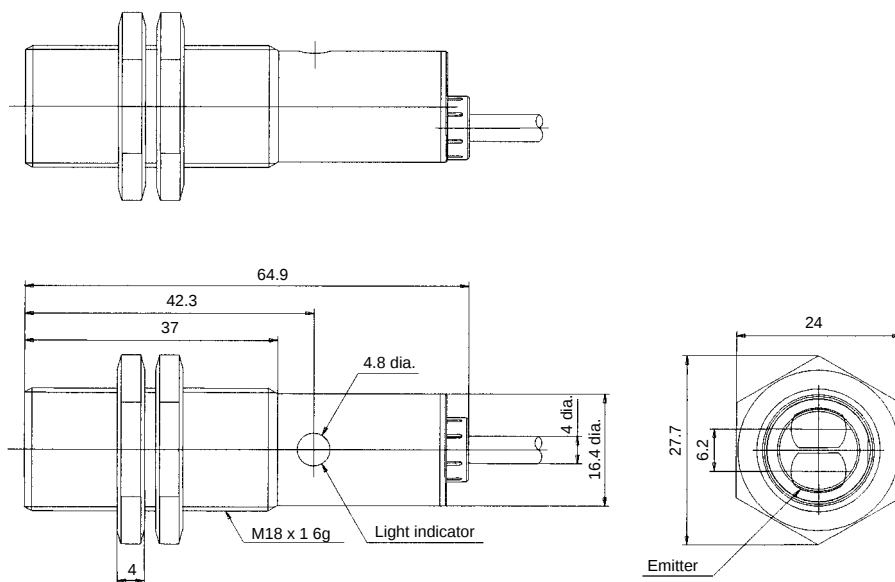
E3F2-DS10□4-P1



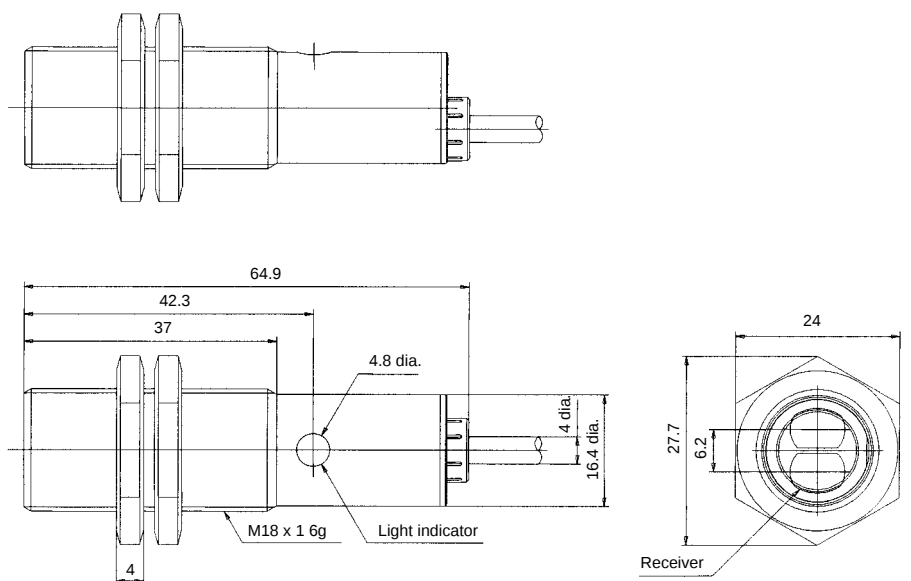
E3F2-DS30□4-P1



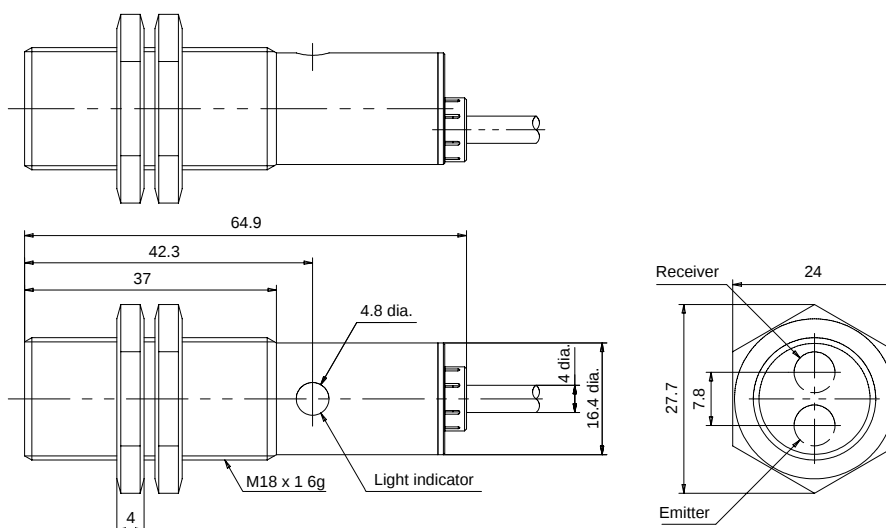
E3F2-7L-M/-C/-S



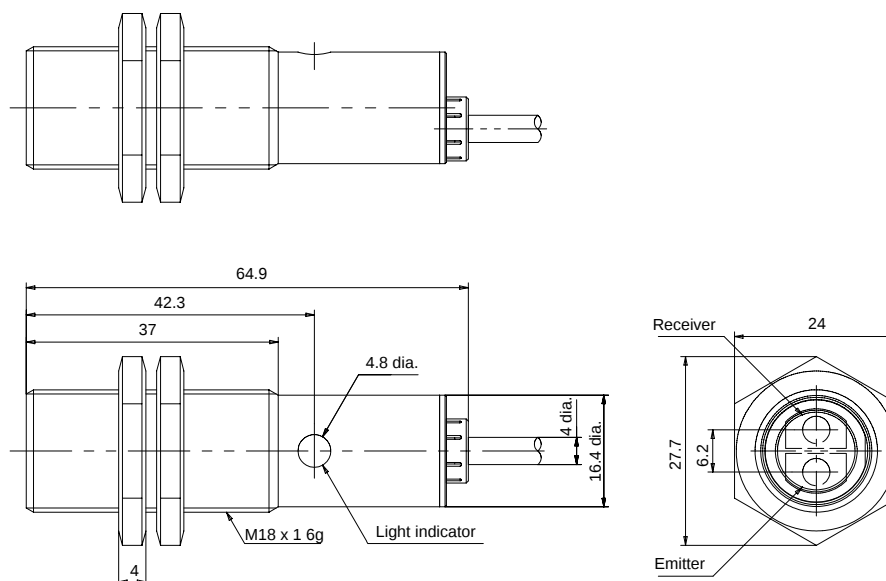
E3F2-7D□4-M/-C/-S



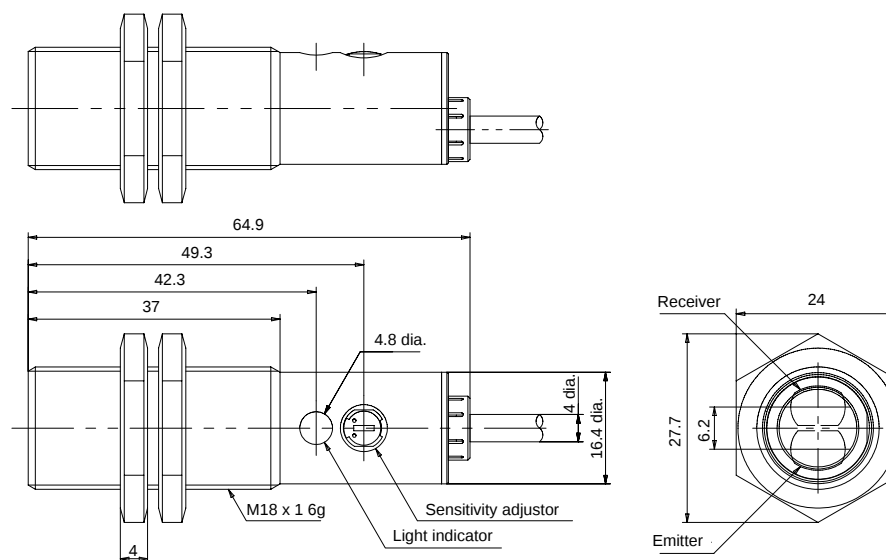
E3F2-R2R□4-M/-C/-S



E3F2-DS10□4-M/-C/-S



E3F2-DS30□4-M/-S



Receiver

[illegible]

Emitter: Polyvinyl chloride-covered cable, 4-mm dia. (11/0.16), 2-conductor (brown and blue)
 Standard length: 2 m
 Receiver: Polyvinyl chloride-covered cable, 4-mm dia. (11/0.16), 3-conductor (brown, blue, and black)
 Standard length: 2 m

E3F2-3LZ Power indicator (emitter)
 E3F2-3DZ□ Light indicator (receiver)

Technical drawing of the M18 x 1.6g cable assembly, showing side and end views with dimensions and labels.

Side View Dimensions:

- Total length: 90
- Length from mounting flange to end of cable: 67.3
- Length from mounting flange to light indicator: 62
- Mounting flange diameter: 5
- Flange thickness: 8
- Flange inner diameter: 4
- Thread specification: M18 x 1.6g
- Light indicator diameter: 5 dia.
- Cable diameter: 16.8 dia.
- Cable jacket thickness: 3.1

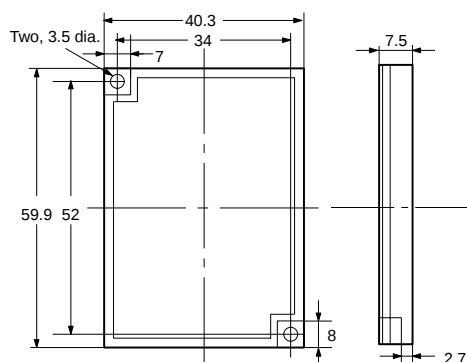
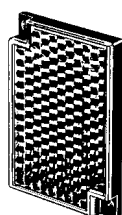
End View Dimensions:

- Receiver diameter: 24
- Emitter diameter: 22
- Emitter offset: 6.2

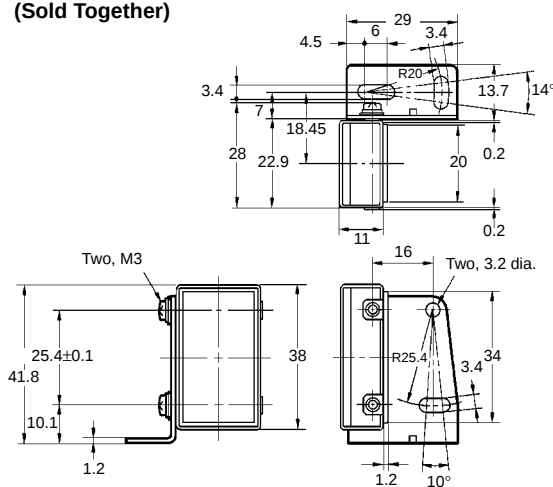
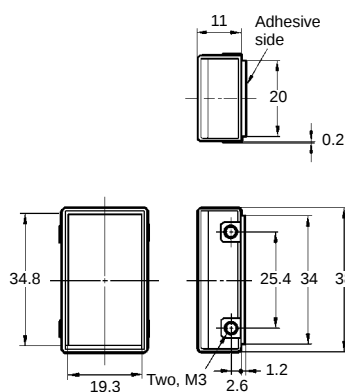
Labels:

- Polyvinyl chloride-covered cable, 4 dia. (11/0.16), 3-conductor (brown, blue, and black)
- Standard length: 2 m
- Light indicator
- Receiver
- Emitter

E39-R1 Retroreflector

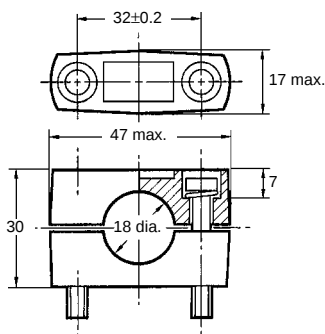
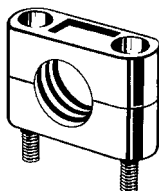


**Mounting Bracket for E39-R3
(Sold Together)**



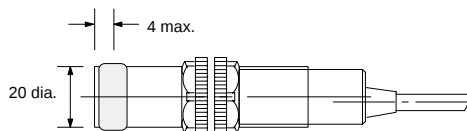
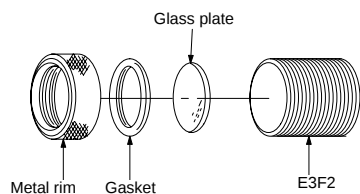
Retroreflector	E39-R3	E39-RSA	E39-RSB
Sensing distance	5 to 100 cm	20 to 50 cm	20 to 80 cm

Y92E-B18 Mounting Bracket



Note: Hexagonal bolt: M5 x 32
Material: plastic

E39-F31 Lens Cap

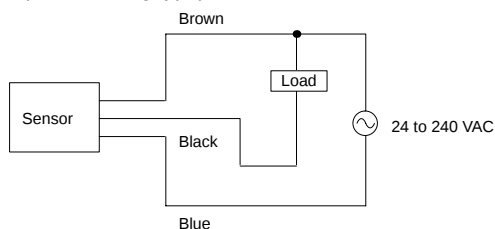


Precautions

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 subject the Photoelectric Sensor to excessive shock when mounting, in keeping with IEC60529 IP66 standards.

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).

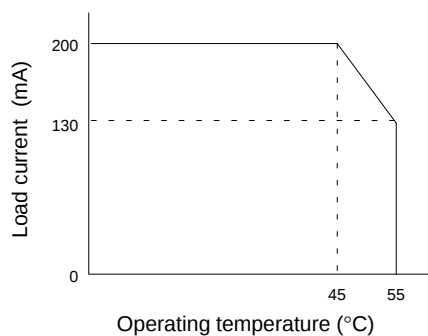


! WARNING

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.

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.

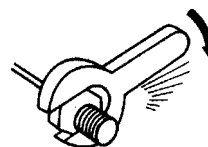
When you use the Photoelectric Sensor at temperatures over 45°C, the load current must be within the rated value shown in the figure below.



Mounting

Do not exceed a torque of

- 2.0 N • m when tightening mounting nuts for plastic models.
- 20.0 N • m 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-E1-6

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

OMRON Corporation

Industrial Automation Company

Industrial Sensors Division
Sensing Devices and Components Division H.Q.
28th Fl., Crystal Tower Bldg.,
1-2-27, Shiromi, Chuo-ku,
Osaka 540-6028 Japan
Phone: (81)6-6949-6012 Fax: (81)6-6949-6021

Printed in Japan
0699-3M (A)