

# Photoelectric sensor in compact M18 housing

# E3F1





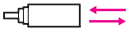


- M18 size Photoelectric sensor with best value at competitive price
- Bright visible red LED enabling easy alignment
- Compact and robust housing for easy integration into machines
- Reliable operation in all industrial environments



## Ordering Information

### Sensors [Refer to Dimensions on page 5.]

 Red light


Sensor type	Sensing distance	Connection method	Model	
			NPN output	PNP output
Through-beam 	 15 m	pre-wired	E3F1-TN11 2M <sup>*1</sup>	E3F1-TP11 2M <sup>*1</sup>
		M12 connector	E3F1-TN21 <sup>*1</sup>	E3F1-TP21 <sup>*1</sup>
Retro-reflective <sup>*2</sup> 	 0.1 to 3 m with E39-R1S	pre-wired	E3F1-RN11 2M	E3F1-RP11 2M
		M12 connector	E3F1-RN21	E3F1-RP21
Diffuse-reflective 	 100 mm	pre-wired	E3F1-DN11 2M	E3F1-DP11 2M
		M12 connector	E3F1-DN21	E3F1-DP21
	 300 mm	pre-wired	E3F1-DN12 2M	E3F1-DP12 2M
		M12 connector	E3F1-DN22	E3F1-DP22

<sup>\*1</sup> Includes the emitter and receiver.

<sup>\*2</sup> The Reflector is sold separately.

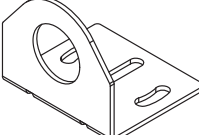

### Reflectors [Refer to Dimensions on page 6.]

Reflectors required for Retro-reflective Sensors: A Reflector is not provided with the Sensor. Be sure to order a Reflector separately.

Sensor	Sensing distance	Appearance	Model	Quantity	Remarks
E3F1-R□	0.1 to 3 m		E39-R1S	1	for E3F1-R□



### Mounting brackets [Refer to Dimensions on page 6.]

A Mounting Bracket is not enclosed with the Sensor. Order a Mounting Bracket separately if required.

Sensor	Appearance	Model (Material)	Quantity	Remarks
all types		E39-L183 (SUS304)	1	Mounting bracket
		E39-L182 (POM)	1	Flush mounting bracket

## Sensor I/O connectors

Models for Connectors: A Connector is not provided with the Sensor. Be sure to order a Connector separately.

Sensor	Size	Cable	Appearance	Cable type	Model	
M12 connector types	M12	Standard	Straight 	2 m	4-wire	XS2F-M12PVC4S2M-EU
				5 m		XS2F-M12PVC4S5M-EU
			Angle 	2 m		XS2F-M12PVC4A2M-EU
				5 m		XS2F-M12PVC4A5M-EU

## Specifications

Model	Sensing method		Through-beam	Retro-reflective	Diffuse-reflective	
	Item	NPN output	Pre-wired M12 Connector	E3F1-TN11 2M E3F1-TN21	E3F1-RN11 2M E3F1-RN21	E3F1-DN11 2M E3F1-DN21
PNP output		Pre-wired M12 Connector	E3F1-TP11 2M E3F1-TP21	E3F1-RP11 2M E3F1-RP21	E3F1-DP11 2M E3F1-DP21	E3F1-DP12 2M E3F1-DP22
Sensing distance			15 m	0.1 to 3 m (with E39-R1S)	100 mm (white paper: 300 × 300 mm)	300 mm (white paper: 300 × 300 mm)
Spot diameter (typical)			—	—	40 × 45 mm Sensing distance of 100 mm	40 × 50 mm Sensing distance of 300 mm
Directional angle			2° min.	2° min.	—	—
Light source (wavelength)			Red LED (624 nm)			
Power supply voltage			10 to 30 VDC (include voltage ripple of 10%(p-p) max.)			
Current consumption			40 mA max. (Emitter 25 mA max. Receiver 15 mA max.)	25 mA max.		
Control output			NPN/PNP (open collector) Load current: 100 mA max. (Residual voltage: 3 V max.), Load power supply voltage: 30 VDC max.			
Operation mode			Light-ON/Dark-ON selectable by wiring			
Indicator			Operation indicator (orange) Stability indicator (green) Power indicator (green): only Emitter of Through-beam			
Protection circuits			Reversed power supply polarity protection, Output short-circuit protection and Reversed output polarity protection			
Response time			0.5 ms			
Sensitivity adjustment			One-turn adjuster			
Ambient temperature range			Operating: -25 to 55°C/ Storage: -30 to 70°C (with no icing or condensation)			
Ambient humidity range			Operating: 35 to 85%RH/ Storage: 35 to 95%RH (with no condensation)			
Degree of protection			IEC: IP66			
Weight (packed state/only sensor)	Pre-wired cable (2M)		Approx. 110 g/ Approx. 50 g, respectively	Approx. 60 g/ Approx. 50 g		
	Connector		Approx. 30 g/ Approx. 10 g, respectively	Approx. 20 g/ Approx. 10 g		
Material	Case		ABS			
	Lens and Display		PMMA			
	Adjuster		POM			
	Nut		ABS			
Accessories			Instruction sheet M18 nuts (4 pcs)	Instruction sheet M18 nuts (2 pcs)		

## Output circuit diagram

### PNP Output

Model	Operation mode	Timing charts	Operation selector	Output circuit
E3F1-TP□ E3F1-RP□ E3F1-DP□	Light-ON		Connect the pink wire (Pin(2)) to the brown (Pin(1))	<p>Through-beam Receivers, Retro-reflective Models, Diffuse-reflective Models</p>
	Dark-ON		Connect the pink wire (Pin(2)) to the blue (Pin(3)) or open the pink wire (Pin(2))	
<p>Through-beam Emitter</p>				

### NPN Output

Model	Operation mode	Timing charts	Operation selector	Output circuit
E3F1-TN□ E3F1-RN□ E3F1-DN□	Light-ON		Connect the pink wire (Pin(2)) to the brown (Pin(1)) or open the pink wire (Pin(2))	<p>Through-beam Receivers, Retro-reflective Models, Diffuse-reflective Models</p>
	Dark-ON		Connect the pink wire (Pin(2)) to the blue (Pin(3))	
<p>Through-beam Emitter</p>				

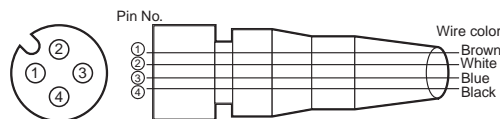
### Connector Pin Arrangement

#### M12 Connector Pin Arrangement



### Connectors (Sensor I/O connectors)

#### M12 4-wire Connectors



Classification	Wire color	Connector pin No.	Application
DC	Brown	①	Power supply (+V)
	White	②	L/on · D/on selectable
	Blue	③	Power supply (0 V)
	Black	④	Output

## Nomenclature

### Straight

with an adjuster:

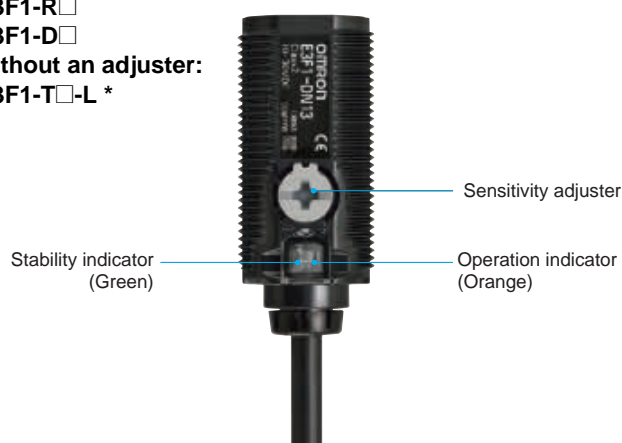
E3F1-T□-D

E3F1-R□

E3F1-D□

without an adjuster:

E3F1-T□-L \*



\* The Emitter has two Power indicators (Green) instead of the Stability indicator (Green) and the Operation indicator (Orange).

## Safety Precautions

Refer to *Warranty and Limitations of Liability*.

### WARNING

This product is not designed or rated for directly or indirectly ensuring safety of persons. Do not use it for such a purpose.



### CAUTION

Never use the product with an AC power supply.  
Do not use the product with voltage in excess of the rated voltage.



Do not use the product with incorrect wiring.  
Otherwise, explosion, fire, malfunction may result.



### Precautions for Safe Use

Be sure to follow the safety precautions below for added safety.

1. Do not use the sensor under the environment with explosive, flammable or corrosive gas.
2. Do not use the sensor under the oil or chemical environment.
3. Do not use the sensor in the water, rain or outdoors.
4. Do not use the sensor in the environment where humidity is high and condensation may occur.
5. Do not use the sensor under the environment under the other conditions in excess of rated.
6. Do not use the sensor in place that is exposed by direct sunlight.
7. Do not use the sensor in place where the sensor may receive direct vibration or shock.
8. Do not use the thinner, alcohol, or other organic solvents.
9. Never disassemble, repair nor tamper with the sensor.
10. Please process it as industrial waste.

### Precautions for Correct Use

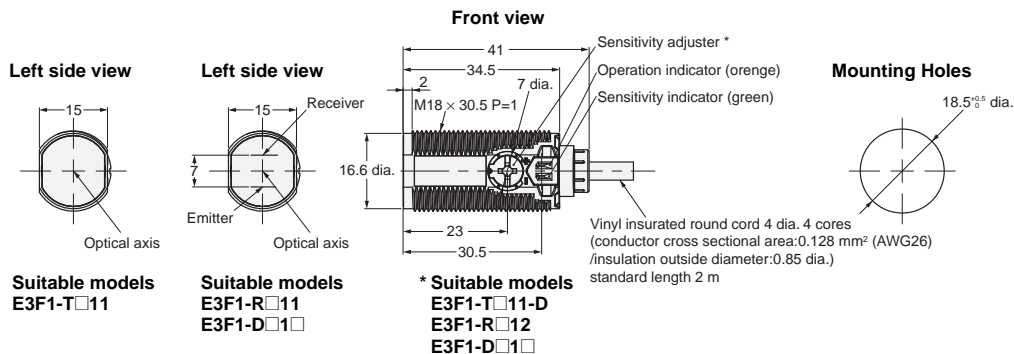
1. Laying Sensor wiring in the same conduit or duct as high-voltage wires or power lines may result in malfunction or damage due to conduit or use shielded cable.
2. Do not pull on the cable with excessive force.
3. If a commercial switching regulator is used, ground the FG (frame ground) terminal.
4. The sensor will be available 100 ms after the power supply is tuned ON. Start to use the sensor 100 ms or more after turning ON the power supply. If the load and the sensor are connected to separate power supplies, be sure to turn ON the sensor first.
5. Output pulses may be generated even when the power supply is OFF. Therefore, it is recommended to first turn OFF the power supply for the load or the load line.
6. The sensor must be mounted using the provided nuts. The proper tightening torque range is between 0.4 and 0.5 N-m.

## Dimensions

### Sensors

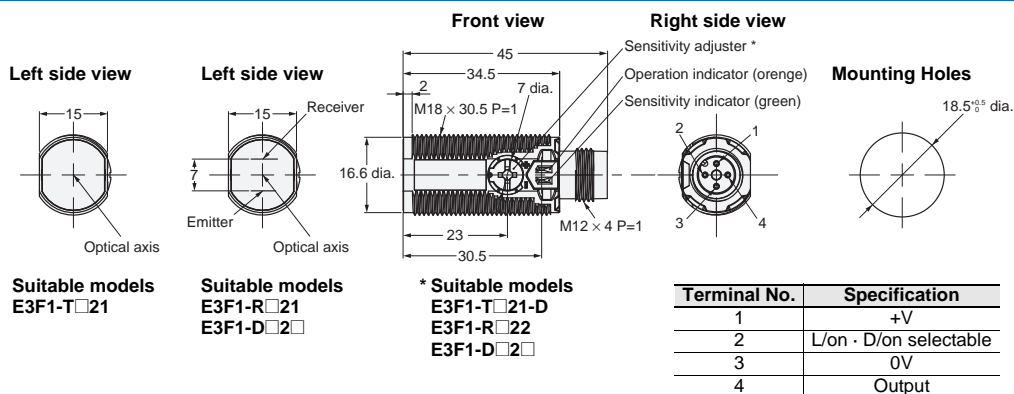
#### Pre-wired Models

- E3F1-T□
- E3F1-R□
- E3F1-D□

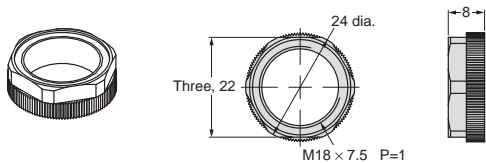


#### M12 Connector Models

- E3F1-T□
- E3F1-R□
- E3F1-D□



#### Attached nut







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