

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 ^{*1}	E3F1-TP11 2M ^{*1}
		M12 connector	E3F1-TN21 ^{*1}	E3F1-TP21 ^{*1}
Retro-reflective ^{*2} 	 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

^{*1} Includes the emitter and receiver.

^{*2} The Reflector is sold separately.

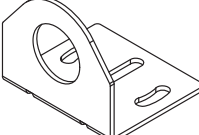
Reflectors [Refer to Dimensions on page 6.]

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	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	
	NPN output	Pre-wired M12 Connector	E3F1-TN11 2M E3F1-TN21	E3F1-RN11 2M E3F1-RN21	E3F1-DN11 2M E3F1-DN21	E3F1-DN12 2M E3F1-DN22
Item	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 po- larity 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	Light incident Light interrupted Operation indicator (orange) ON OFF Output transistor ON OFF Load (e.g., relay) Operate Reset (Between blue and black leads)	Connect the pink wire (Pin(2)) to the brown (Pin(1))	Through-beam Receivers, Retro-reflective Models, Diffuse-reflective Models
	Dark-ON	Light incident Light interrupted Operation indicator (orange) ON OFF Output transistor ON OFF Load (e.g., relay) Operate Reset (Between blue and black leads)	Connect the pink wire (Pin(2)) to the blue (Pin(3)) or open the pink wire (Pin(2))	
	Through-beam Emitter			

NPN Output

Model	Operation mode	Timing charts	Operation selector	Output circuit
E3F1-TN□ E3F1-RN□ E3F1-DN□	Light-ON	Light incident Light interrupted Operation indicator (orange) ON OFF Output transistor ON OFF Load (e.g., relay) Operate Reset (Between brown and black leads)	Connect the pink wire (Pin(2)) to the brown (Pin(1)) or open the pink wire (Pin(2))	Through-beam Receivers, Retro-reflective Models, Diffuse-reflective Models
	Dark-ON	Light incident Light interrupted Operation indicator (orange) ON OFF Output transistor ON OFF Load (e.g., relay) Operate Reset (Between brown and black leads)	Connect the pink wire (Pin(2)) to the blue (Pin(3))	
	Through-beam Emitter			

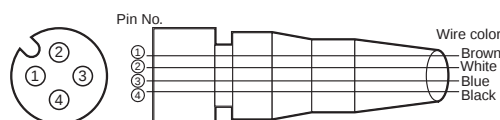
Connector Pin Arrangement

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:

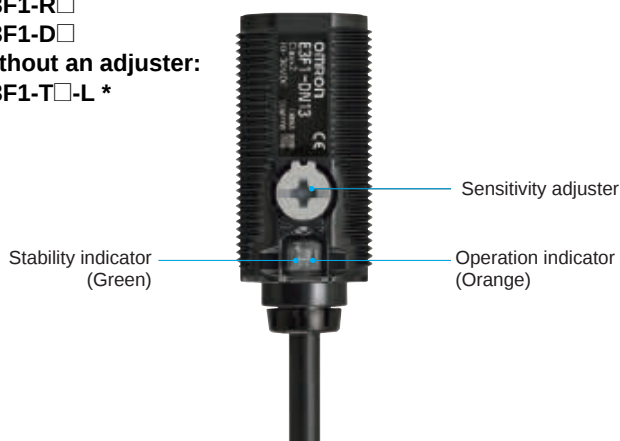
E3F1-T□-D

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

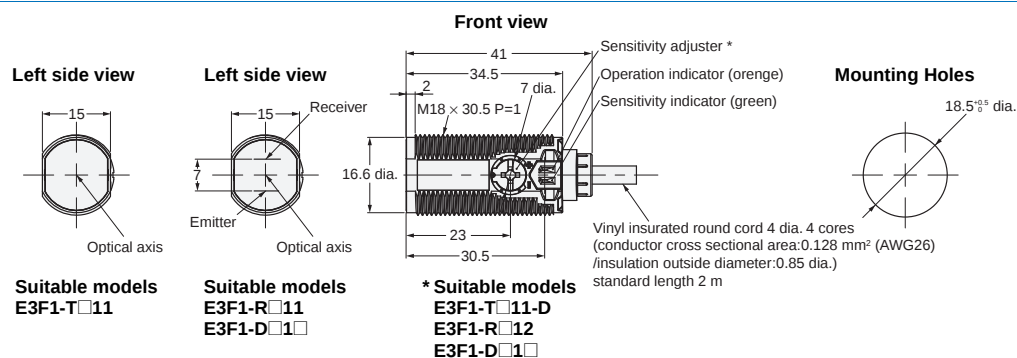
1. Laying Sensor wiring in the same conduit or duct as high-voltage wires or power lines may result in malfunction or damage due to conduit or use shielded cable.
2. Do not pull on the cable with excessive force.
3. If a commercial switching regulator is used, ground the FG (frame ground) terminal.
4. 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

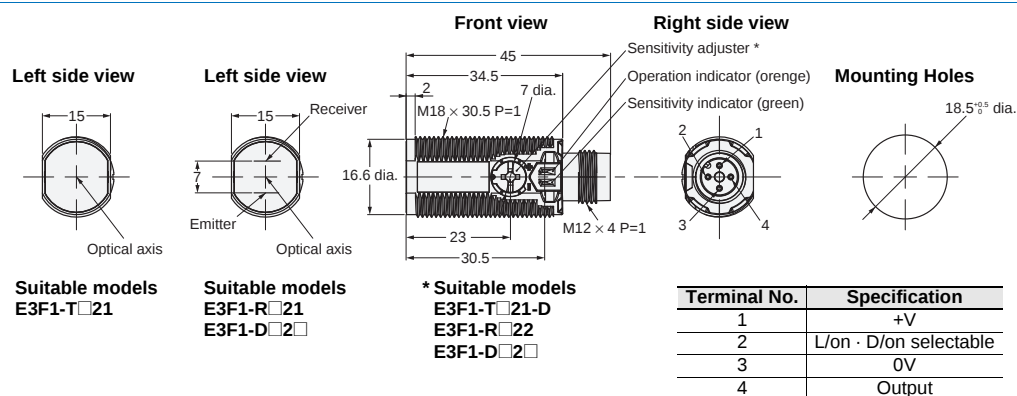
Pre-wired Models

E3F1-T□
E3F1-R□
E3F1-D□

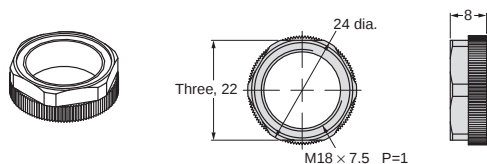


M12 Connector Models

E3F1-T□
E3F1-R□
E3F1-D□



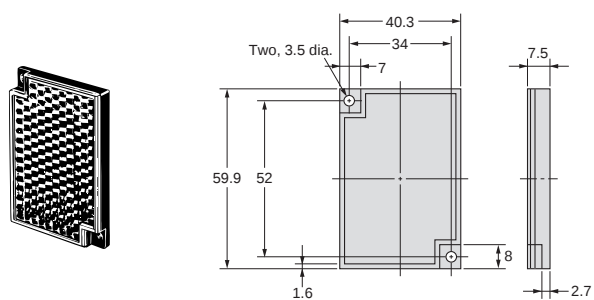
Attached nut



Accessories (Order Separately)

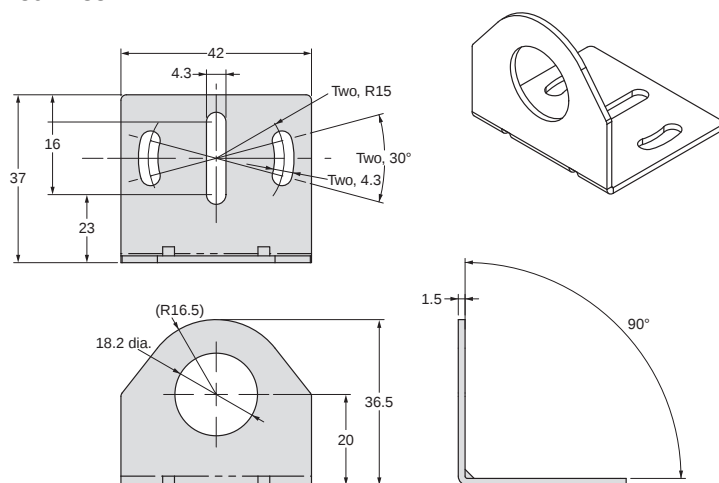
Reflectors

E39-R1S



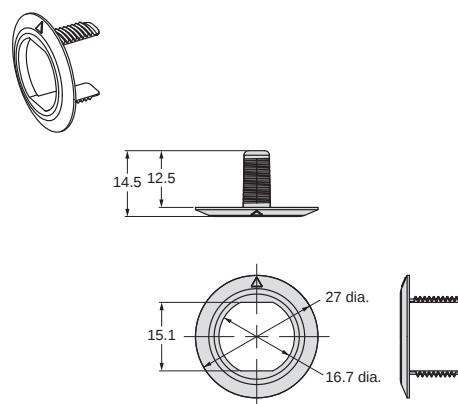
Mounting brackets

E39-L183



Mounting brackets

E39-L182



Read and Understand This Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

PROGRAMMABLE PRODUCTS

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

Disclaimers

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

ERRORS AND OMISSIONS

The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

Cat. No. E94E-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.industrial.omron.eu