Photoelectric Sensors E3F2

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)
- Enclosure rating IP67
- DC switching types with connectors for easy maintenance
- Full metal plug-in type
- Sensing distance separate types: 7 m, 10 m
- Retroreflective polarizing types: 2 m, 4 m
- Background suppression type: 10 cm
- Long detection distance (0.3 m, 1 m) 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 240 VAC)
- Short-circuit and reverse connection protection (DC switching type)
- UL and CSA approved (AC switching types)
- UL listed (DC switching types)



Ordering Information

■ DC-Switching Models

Housing Material: Plastic

Note: Shaded models are normally stocked.

Sensing method		Appearance	Connection	Sensing	Ν	lodel	
		method		distance	PNP output	NPN output	
	Multi purpose			pre-wired	7 m	E3F2-7B4	E3F2-7C4
T hurson in the second				M12 connector		E3F2-7B4-P1	E3F2-7C4-P1
Through-beam	- precision det	ection (*1)	axial	pre-wired	10 m	E3F2-10B4	E3F2-10C4
	- test input			M12 connector		E3F2-10B4-P1	E3F2-10C4-P1
	Non-polarizing	,		pre-wired	0.1 - 2 m ^(*2)	E3F2-R2B4	E3F2-R2C4
	(without MSR	function)		M12 connector		E3F2-R2B4-P1	E3F2-R2C4-P1
	Polarizing	Fixed	▫⊐◨҉⇒	pre-wired	0.1 - 4 m ^(*3)	E3F2-R4B4F	E3F2-R4C4F
Retro-	(with MSR	sensitivity	axial	M12 connector		E3F2-R4B4F-P1	E3F2-R4C4F-P1
reflective (incl. reflector	function)	Adjustable	axiai	pre-wired		E3F2-R4B4	E3F2-R4C4
E39-R1 or		sensitivity		M12 connector		E3F2-R4B4-P1	E3F2-R4C4-P1
E39-R1S)	Polarizing (with MSR function)			pre-wired	0.1 - 2 m ^(*2)	E3F2-R2RB41	E3F2-R2RC41
			radial	M12 connector		E3F2-R2RB41-P1	E3F2-R2RC41-P1
	Fixed sensitiv	ty		pre-wired	0.1 m	E3F2-DS10B4-N	E3F2-DS10C4-N
	Wide-beam characteristics			M12 connector		E3F2-DS10B4-P1	E3F2-DS10C4-P1
	Adjustable ser	nsitivity	▫⊐∰≔	pre-wired	0.3 m	E3F2-DS30B4	E3F2-DS30C4
				M12 connector		E3F2-DS30B4-P1	E3F2-DS30C4-P1
Diffuse			axial	pre-wired	1 m	E3F2-D1B4	E3F2-D1C4
reflective				M12 connector		E3F2-D1B4-P1	E3F2-D1C4-P1
	Adjustable ser	nsitivity		pre-wired	0.3 m	E3F2-DS30B41	E3F2-DS30C41
			radial	M12 connector		E3F2-DS30B41-P1	E3F2-DS30C41-P1
	Fixed sensing	distance		pre-wired	10 cm	E3F2-LS10B4	E3F2-LS10C4
Background suppression			▫◻∰⇒	M12 connector		E3F2-LS10B4-P1	E3F2-LS10C4-P1
			axial				

*1) with slit E39-ES18

*2) with reflector E39-R1

*3) with reflector E39-R1S

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)

Note: Shaded models are normally stocked.

S	ensing metho	d	Appearance	Connection	Sensing	Mc	odel
				method	distance	PNP output	NPN output
Through-beam	m Multi purpose			pre-wired	7 m	E3F2-7B4-M	E3F2-7C4-M
				M12 connector		E3F2-7B4-M1-M	E3F2-7C4-M1-M
	- precision de	tection		pre-wired	10 m	E3F2-10B4-M	E3F2-10C4-M
	- test input		axial	M12 connector		E3F2-10B4-M1-M	E3F2-10C4-M1-M
Retro-	Polarizing	Fixed		pre-wired	0.1 - 2 m ^(*1)	E3F2-R2RB4-M	E3F2-R2RC4-M
reflective	(with MSR	sensitivity		M12 connector		E3F2-R2RB4-M1-M	E3F2-R2RC4-M1-M
(incl. reflector	function)		▫⊐◨҉Ҍ⇒≬	pre-wired	0.1 - 4 m ^(*2)	E3F2-R4B4F-M	E3F2-R4C4F-M
E39-R1)			2	M12 connector		E3F2-R4B4F-M1-M	E3F2-R4C4F-M1-M
		Adjustable	axial	pre-wired		E3F2-R4B4-M	E3F2-R4C4-M
		sensitivity		M12 connector		E3F2-R4B4-M1-M	E3F2-R4C4-M1-M
	Polarizing (with MSR fur	nction)	radial	pre-wired	0.1 - 2 m ^(*1)	E3F2-R2RB41-M	E3F2-R2RC41-M
Diffuse	Fixed sensing	distance		pre-wired	0.1 m	E3F2-DS10B4-M	E3F2-DS10C4-M
reflective	Wide-beam cl	haracteristics		M12 connector		E3F2-DS10B4-M1-M	E3F2-DS10C4-M1-M
	Adjustable se	nsing	ı⊂t∰⇒	pre-wired	0.3 m	E3F2-DS30B4-M	E3F2-DS30C4-M
	distance		-	M12 connector		E3F2-DS30B4-M1-M	E3F2-DS30C4-M1-M
			axial	pre-wired	1 m	E3F2-D1B4-M	E3F2-D1C4-M
				M12 connector		E3F2-D1B4-M1-M	E3F2-D1C4-M1-M
	Adjustable se	nsing	_	pre-wired	0.3 m	E3F2-DS30B41-M	E3F2-DS30C41-M
	distance		radial	M12 connector]	E3F2-DS30B41-M1-M	E3F2-DS30C41-M1-M
Background	Fixed sensing	l		pre-wired	10 cm	E3F2-LS10B4-M	E3F2-LS10C4-M
suppression	distance		©⊡[∰]≒ axial	M12 connector		E3F2-LS10B4-M1-M	E3F2-LS10C4-M1-M

*1) with reflector E39-R1

*2) with reflector E39-R1S

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 (Stainless steel)

Note: Shaded models are normally stocked.

Sensing method		Appearance	Connection	Sensing	Model		
			method	distance	PNP output	NPN output	
Through-beam			pre-wired	7 m	E3F2-7B4-S	E3F2-7C4-S	
		axial	M12 connector		E3F2-7B4-M1-S	E3F2-7C4-M1-S	
	Polarizing	_	pre-wired	0.1 - 2 m	E3F2-R2RB4-S	E3F2-R2RC4-S	
reflective (incl. reflector E39-R1)	(with MSR function)	ɑ∰⊐≕ ∦ axial	M12 connector	(with reflector E39-R1)	E3F2-R2RB4-M1-S	E3F2-R2RC4-M1-S	
	Fixed sensitivity		pre-wired	0.1 m	E3F2-DS10B4-S	E3F2-DS10C4-S	
reflective	Wide-beam characteristics	▫◻◨◧ੜ	M12 connector		E3F2-DS10B4-M1-S	E3F2-DS10C4-M1-S	
	Adjustable sensitivity	axial	pre-wired	0.3 m	E3F2-DS30B4-S	E3F2-DS30C4-S	
			M12 connector		E3F2-DS30B4-M1-S	E3F2-DS30C4-M1-S	

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

Note: Shaded models are normally stocked.

Sensing method				Sensing	Model	
			method	distance	Light-ON	Dark-ON
Through-beam		▫⊏◨;)→◨;)⊃▫	pre-wired	3 m	E3F2-3Z1	E3F2-3Z2
		axial				
Retro-	Non-polarizing		pre-wired	0.1 - 2 m	E3F2-R2Z1	E3F2-R2Z2
reflective	(without MSR function)	▫⊐◨҉⇒≶		(with		
(incl. reflector		axial		reflector		
E39-R1)		aniai		E39-R1)		
Diffuse	Fixed sensing distance		pre-wired	0.1 m	E3F2-DS10Z1-N	E3F2-DS10Z2-N
reflective	Wide-beam characteristics	▫⊏〔∰)⇒				
		axial				

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)	E39-R1	60 x 40 mm (included in
	0.1 - 2.4 m (radial)		some models)
	0.1 - 4.3 m (axial)	E39-R1S	for E3F2-R4
	0.1 - 4.2 m (axial)	E39-R7	84 mm
	0.1 - 2.7 m (radial)		
	0.1 - 5.3 m (axial)	E39-R8	100 x 100 mm
	0.1 - 3.1 m (radial)		
	0.1 - 4.3 m (axial)	E39-R40	80 x 80 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	screw mount
		Y92E-G18	quick access mounting
Slit		E39-ES18	for E3F2-10 - precision detection

Note: Shaded models are normally stocked.

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

Note: Shaded models are normally stocked.

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

Ratings / Characteristics of DC Switching Models

Item		E3F2-7	E3F2-10	E3F2-R2□4-□	E3F2-R2R	E3F2-R4	E3F2-DS10	E3F2-DS30	E3F2- D1□4-□	E3F2- LS10□4-□
Sensing	method	Through-bean	າ	Retroreflective			Diffuse reflective	ve		
		- multi purpose	- Precision detection [6.] - test input	Non- polarizing	Polarizing		Wide beam characteristic	Adjustable sen	ising distance	Background suppression
Power su	upply voltage	10 to 30 V DC	12 to 24 V DC	10 to 30 V DC						
Current	consumption	50 mA max.		25 mA max.	30 mA max.		25 mA max.	30 mA max.		
Rated se [1.]	ensing distance	7 m	10 m	0.1 - 2 m (with reflector E3	9-R1)	0.1 - 4 m (with reflector E39-R1S)	0.1 m (5 x 5 cm white mat paper)	0.3 m (10 x 10 cm white mat paper)	1 m (30 x 30 cm white mat paper)	0.1 m (10 x 10 cm white mat paper)
for different	ensing distance ent reflector f. to accesso-	-		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	E39-R1S:4.3 m E39-R7: 4.8 m E39-R8: 5.6 m E39-R40:4.3 m E39-RS3: 2 m	_			
Standard	d object	Opaque: 11 m	m dia. min.	Opaque: 56 mm o			-			
Direction	al angle	3° to 20°					-			
Different (hysteres		-					20% max.			5% max
Black/wh	nite error	-							•	3%
Respons		-	Reset: 2.5 ms			1 ms max	2.5 ms max.		1 ms max.	
Control of			en collector), loa	ad current: 100 mA	max. (residual					
Power re		50 ms				100 ms max.	50 ms		100 ms	
	illumination			nax. / Sunlight: 10						
	temperature			age: -30 to 70 °C (8	,				
Ambient	,			age: 35% to 95% (sation)				
	n resistance			een energized par						
	c strength			r 1 min between ei	• •					
	resistance			mplitude for 2 hrs	each direction (2	X, Y, Z)				
	sistance			rection (X, Y, Z)						
	re ratings	IP67 [3.]; NEM								
Light sou			880 nm/850 nm		Red LED (660		Infrared LED (8			Red LED (660 nm)
Indicator	5	Light incident / power indi- cator for light source (red)	Output (orange) / light emission (red)	Light incident / pc indicator for light		Light incident (red) / stability (green)	for light source	power indicator (red)	Light incident (red) / stability (green)	Output indicator (orange) / sta bility (green)
	ty adjustment	Fixed				Fixed / Adjustable	Fixed	Adjustable		Fixed
	ion method	2 m, 5 m pre-v		C, dia. 4 mm (18 /	0.12) [4.]) or M1	2-connector				
Test Inpu		-	[7.]	-						
Operatio		Light-ON or D	ark-ON selectat	bie by wiring						
Weight (100								
0000	pre-wired (2 m)			60 g						
	connector	40 g		20 g						
0000	pre-wired (2 m)	180 g		90 g						
Circuit p	connector	120 g Output abort o		50 g	olo rity (T
			ABS; lens: PMN	r supply reverse po	Jialily					
Housing	materials	Plastic (case: Nickel brass	ABS; lens: PMIN Nickel brass		Niekel brace	Nickel brass	Nickel brass	Niekel broce	Niekel brass	Niekel brees
		Stainless	INICKEI DIASS	-	Nickel brass	NICKEI DIASS		Nickel brass Stainless	Nickel brass	Nickel brass
		steel [5.]	-	_	Stainless steel [5.]	_	Stainless steel [5.]	steel [5.]	-	[⁻

Note: 1. For stable sensing distance in detail, please refer to "Engineering Data"

 ${\bf 2.}\,$ 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.

6. with slit E39-ES18

7. PNP models -B4: V_{cc} to V_{cc} -2.5 V: Emitting OFF (Source current: 3 mA max.) / Open or 0 to 2.5 V: Emitting ON (Leakage current: 0.1 mA max.)

NPN models -C4: 0 to 2.5 V: Emitting OFF (Source current: 3 mA max.) / Open or Vcc to Vcc -2.5 V: Emitting ON (Leakage current: 0.1 mA max.)

■ 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 dif- ferent 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	Operating: -25 to 55 °C / Storage:	-30 to 70 °C (with no icing or conde	ensation)			
Ambient humidity	Operating: 35% to 85% / Storage:	35% to 95% (without condensation))			
Insulation resistance	20 M Ω min. at 500 V DC between	energized parts and case				
Dielectric strength	1500 VAC, 50 / 60 Hz for 1 min be	tween energized parts and case				
Vibration resistance	10 to 55 Hz, 1.5 mm double amplit	ude for 2 hrs each direction (X, Y, Z	<u>(</u>)			
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 li	ght source (red)				
Sensitivity adjustment	Fixed					
Connection method	2 m, 5 m pre-wired cable (PVC dia. 4 mm (14 / 0.15))					
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)					

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")

■ Operating Range (typical)

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



Through-beam Models (axial) E3F2-3Z

Retroreflective Models (axial) E3F2-R2Z (non polarizing)

and reflectors

300

200

100

-100

-200

-300

Distance Y (mm)



cal sensing distar E39-R1: 3.4 m E39-R7: 3.9 m E39-R8: 5.2 m

Distance X (m)

6

Through-beam Models (axial) E3F2-10□



Retroreflective Models (axial) E3F2-R2□4-□ (non polarizing) and reflectors



_

Retro-reflective Models (axial) E3F2-R4_4_-_ (polarizing)



Retroreflective Models (radial) E3F2-R2R 41- (polarizing)

2 3

and reflectors



Retroreflective Models (axial) E3F2-R2R□4-□ (polarizing) and reflectors



E3F2-DS10 4- (wide-beam type)

Diffuse reflective Models (axial)

60 80 100 120 140 Distance X (mm)





Diffuse reflective Models (axial) E3F2-DS30 4-





20







Excess Gain Ratio vs. Distance (typical)











Retroreflective Models (axial) E3F2-R4_4--



Retroreflective Models (axial) E3F2-R2Z (non polarizing)

and reflectors





Distance X (m)





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



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



Diffuse reflective Models (axial) E3F2-DS3004-0





Diffuse reflective Models (axial) E3F2-D1 4-



■ Light spot vs. sensing distance

■ Incline (left and right) ■ Incline (up and down)



■ Object material vs. sensing distance



■ Output Circuits

Structure of Sensor I/O Connector

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



■ PNP Output

Model	Output transistor status	Timing chart	Connection method	Output circuit
E3F2-□B4-□ (except for E3F2-10B4-□ and E3F2-LS10B4-□)	-	-	-	Through-beam emitter
	ON when light is incident. (Light-ON)	Incident Interrupted Output (red) Output ON Utput transistor DFF Load Operate (relay) Release	Connect the pink (Pin ⊚) and brown (Pin ⊙) cords or open the pink cord (Pin ⊚).	Light indicator Stability indicator 0 to 30 VDC Red Creen Jorcula 0 to 30 VDC Black 0 to 30 VDC 0 to 30 VDC Perick 0 to 30 VDC 0 to 30 VDC Connector Pin Arrangement 0 to 30 VDC Size_74484
	ON when light is interrupted. (Dark- ON)	Incident Interrupted Output indicator (red) Output transistor (relay) Release	Connect the pink (Pin ③) and blue (Pin ③) cords.	Light indicator Stability indicator 0 to 30 VDC Red Green Black icrean Black 0 v Pink Black 0 v Black 0 v 0 v Pink Black 0 v Black 0 v 0 v Black

Model	Output transistor status	Timing chart	Connection method	Output circuit
E3F2-10B4-□	-	Test ON input OFF Light ON emission OFF Indicator ON OFF	-	Through-beam emitter
	ON when light is incident. (Light-ON)	Incident Interrupted Output (orange) Output Coutput transistor Load (relay) Release	Connect the pink (Pin ③) and brown (Pin ④) cords or open the pink cord (Pin ③).	Orange Orange Orange Main Circuit Connector Pin Arrangement © © © © ©
	ON when light is interrupted. (Dark- ON)	Incident Interrupted Output indicator (orange) Output transistor DFF Load (relay) Release	Connect the pink (Pin ③) and blue (Pin ④) cords.	Output indicator Orange Orange Grange Corange Connector Pin Arrangement
E3F2-LS10B4-□	ON when light is incident. (Light-ON)	Incident Interrupted Output (orange) OFF Output transistor (relay) Release	Connect the pink (Pin ⊚) and brown (Pin ⊙) cords or open the pink cord (Pin ⊚).	Output indicator Orange Green
	ON when light is interrupted. (Dark- ON)	Incident Interrupted Output (orange) Output transistor (relay) Release	Connect the pink (Pin ③) and blue (Pin ③) cords.	Output Indicator Orange Green

Note: Terminal numbers for connector type.

■ NPN Output

Model	Output transistor status	Timing chart	Connection method	Output circuit
E3F2-□C4-□ (except for E3F2-10C4-□ and E3F2-LS10C4-□)	_		-	Through-beam emitter
	ON when light is incident. (Light-ON)	Incident Interrupted Output (red) Output ON Utput transistor OFF Load Operate (relay) Release	Connect the pink (Pin ②) and brown (Pin ⊙) cords or open the pink cord (Pin ②).	Output Stability Brown 10 to 30 VDC indicator indicator Indicator Indicator Red Green Black Indicator Vz = 36 V Pirk Mode selection Connector Pin Arrangement * Only on models S32-R4C4-L and Image: S32-R4C4-L Image: S32-R4C4-L
	ON when light is interrupted. (Dark- ON)	Incident Interrupted Output (red) Output transistor OFF Load (relay) Release	Connect the pink (Pin ⊚) and blue (Pin ⊚) cords.	Output indicator Stability indicator Brown 10 to 30 VDC Red indicator Indicator Indicator Red indicator Black 10 mA Load Black 0 V Pink Mode selection Connector Pin Arrangement * Only on models Image: Signal Arrangement E3F2-R4C4-II and Image: Image: Signal Arrangement
E3F2-10C4-□	_	Test ON OFF	-	Through-beam emitter Light emission Red Main Circuit Gircuit Gircuit Blue (3)
	ON when light is incident. (Light-ON)	Incident Interrupted Output (red) Output OFF Output transistor OFF Load (relay) Release	Connect the pink (Pin ②) and brown (Pin ①) cords or open the pink cord (Pin ②).	Light Orange Understein Orange Main circuit Councetor Pin Arrangement Orange O
	ON when light is interrupted. (Dark- ON)	Incident Interrupted Output (orange) Output transistor Load (relay) Release	Connect the pink (Pin ②) and blue (Pin ③) cords.	Light indicator Orange Main circuit Z _D : V ₂ = 36 V Pink Mode selection Connector Pin Arrangement © ©

Model	Output transistor status	Timing chart	Connection method	Output circuit
E3F2-LS10C4-□	ON when light is incident. (Light-ON)	Incident Interrupted Output (red) Output transistor (relay) Nelease	Connect the pink (Pin ②) and brown (Pin ⊙) cords or open the pink cord (Pin ③).	Output indicator Orange Green Main circuit Z _D : V _Z = 36 Pink Mode selection Connector Pin Arrangement © @ @ @
	ON when light is interrupted. (Dark- ON)	Incident Interrupted Output indicator OFF Orage Output transistor OFF Load (relay) Release	Connect the pink (Pin ③) and blue (Pin ③) cords.	Control of the selection Connector Pin Arrangement Connector Pin Arrangement Connector Pin Connector Pin Connec

Note: Terminal numbers for connector type.

■ AC Output

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)	Incident Interrupted Output indicator OFF (red) OFF Utput ON transistor OFF Load Operate (relay) Release	_	Light Indicator A 200 mA and 100 max Load Black
E3F2-3Z2 E3F2-R2Z2 E3F2-DS10Z2-N	ON when light is interrupted. (Dark- ON)	Incident Interrupted Output (red) Output transistor (relay) Release	-	Blue 24 to 240 VAC

■ DC-Switching Models, plastic, axial type



■ DC-Switching Models, plastic, radial type



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



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



■ AC-Switching Models, plastic, axial type



■ Accessories (Order Separately)







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:** The 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



Certain Terms and Conditions of Sale

- 1. Offer: Acceptance. These terms and conditions (these "Terms") are deemed part of all catalogs, manuals or other documents, whether electronic or in writ-ing, relating to the sale of goods or services (collectively, the "<u>Goods</u>") by Omron Electronics LLC and its subsidiary companies ("<u>Seller</u>"). Seller hereby objects to any terms or conditions proposed in Buyer's purchase order or other documents which are inconsistent with, or in addition to, these Terms. Please contact your Omron representative to confirm any additional terms for sales from your Omron company
- Prices. All prices stated are current, subject to change without notice by 2.
- Seller. Buyer agrees to pay the price in effect at time of shipment. <u>Discounts.</u> Cash discounts, if any, will apply only on the net amount of invoices sent to Buyer after deducting transportation charges, taxes and duties, and will be allowed only if (i) the invoice is paid according to Seller's payment terms and (ii) Buyer has no past due amounts owing to Seller. 3
- <u>Grders</u>. Seller will accept no order less than \$200 net billing. <u>Governmental Approvals</u>. Buyer shall be responsible for, and shall bear all costs involved in, obtaining any government approvals required for the impor-tation or sale of the Goods. <u>Taxes</u>. All taxes, duties and other governmental charges (other than general taxes).
- 6. real property and income taxes), including any interest or penalties thereon, imposed directly or indirectly on Seller or required to be collected directly or indirectly by Seller for the manufacture, production, sale, delivery, importation, consumption or use of the Goods sold hereunder (including customs duties and sales, excise, use, turnover and license taxes) shall be charged to and
- Financial. If the financial position of Buyer at any time becomes unsatisfactory to Seller. Seller reserves the right to stop shipments or require satisfactory security or payment in advance. If Buyer fails to make payment or otherwise comply with these Terms or any related agreement, Seller may (without liability) 7 and in addition to other remedies) cancel any unshipped portion of Goods sold hereunder and stop any Goods in transit until Buyer pays all amounts, includ-ing amounts payable hereunder, whether or not then due, which are owing to it by Buyer. Buyer shall in any event remain liable for all unpaid accounts
- Cancellation: Etc. Orders are not subject to reacheduling or cancellation unless Buyer indemnifies Seller fully against all costs or expenses arising in 8 connection therewith.
- Force Majeure. Seller shall not be liable for any delay or failure in delivery resulting from causes beyond its control, including earthquakes, fires, floods, strikes or other labor disputes, shortage of labor or materials, accidents to machinery, acts of sabotage, riots, delay in or lack of transportation or the 9.
- 10. Shipping: Delivery. Unless otherwise expressly agreed in writing by Seller:
 a. Shipping: Delivery. Unless otherwise expressly agreed in writing by Seller:
 b. Such carrier shall be by a carrier selected by Seller;
 b. Such carrier shall act as the agent of Buyer and delivery to such carrier shall constitute delivery to Buyer;
 All colors and chipments of Grade, shall be ECR chipping point (unless of the second secon
 - All sales and shipments of Goods shall be FOB shipping point (unless oth-erwise stated in writing by Seller), at which point title to and all risk of loss of the Goods shall pass from Seller to Buyer, provided that Seller shall retain a c. security interest in the Goods until the full purchase price is paid by Buyer; Delivery and shipping dates are estimates only. Seller will package Goods as it deems proper for protection against normal
- handling and extra charges apply to special conditions. <u>Claims.</u> Any claim by Buyer against Seller for shortage or damage to the Goods occurring before delivery to the carrier must be presented in writing to Seller within 30 days of receipt of shipment and include the original transportation bill signed by the carrier noting that the carrier received the Goods from Seller in the condition claimed.

- 12. Warranties. (a) Exclusive Warranty. Seller's exclusive warranty is that the <u>Warranties</u>. (a) <u>Exclusive Warranty</u>. Seller's exclusive warranty is that the Goods will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Seller (or such other period expressec in writing by Seller). Seller disclaims all other warranties, express or implied. (b) <u>Limitations</u>. SELLER MAKES NO WARRANTY OR REPRESENTATION EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABIL-ITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE GOODS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE GOODS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. Seller further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Goods or other-wise of any intellectual property right. (c) Buyer Remedy. Seller's sole obligawise of any intellectual property right. (c) <u>Buyer Remedy.</u> Seller's sole obliga-tion hereunder shall be to replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the noncomplying Good or, at Seller's election, to repay or credit Buyer an amount equal to the purchase price of the Good; provided that in no event shall Seller be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Goods unless Seller's analysis confirms that the Goods were properly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any goods by Buyer must be approved in writing by Seller before shipment. Seller shall not be liable for the suitability or unsuitability or the results from the use of Goods in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any
- assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty. <u>Damage Limits; Etc.</u> SELLER SHALL NOT BE LIABLE FOR SPECIAL, INDI-RECT OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUC-TION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE GOODS, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY. Further, in no event shall liability of Seller exceed the individual price of the Good on which liability is asserted.
- Seller exceed the individual price of the Good on which liability is asserted. Indemnities. Buyer shall indemnify and hold harmless Seller, its affiliates and its employees from and against all liabilities, losses, claims, costs and expenses (including attorney's fees and expenses) related to any claim, inves-tigation, litigation or proceeding (whether or not Seller is a party) which arises or is alleged to arise from Buyer's acts or omissions under these Terms or in any way with respect to the Goods. Without limiting the foregoing, Buyer (ai its own expense) shall indemnify and hold harmless Seller and defend or settle any action brought against Seller to the extent that it is based on a claim that any Good made to Buyer service infringed installectual property rights of 14 any Good made to Buyer specifications infringed intellectual property rights of another party.
- <u>Property: Confidentiality.</u> The intellectual property embodied in the Goods is the exclusive property of Seller and its affiliates and Buyer shall not attempt to duplicate it in any way without the written permission of Seller. Notwithstand-15. ing any charges to Buyer for engineering or tooling, all engineering and tooling shall remain the exclusive property of Seller. All information and materials supplied by Seller to Buyer relating to the Goods are confidential and propri-
- Supplied by Seller to Buyer relating to the Goods are confidential and propri-etary, and Buyer shall limit distribution thereof to its trusted employees and strictly prevent disclosure to any third party. <u>Miscellaneous</u>. (a) <u>Waiver</u>. No failure or delay by Seller in exercising any right and no course of dealing between Buyer and Seller shall operate as a waive of rights by Seller. (b) <u>Assignment</u>. Buyer may not assign its rights hereunder without Seller's written consent. (c) <u>Amendment</u>. These Terms constitute the entire agreement between Buyer and Seller relating to the Goods, and no pro-vision may be changed or waived unless in writing signed by the parties. (d) Severability. If any provision hereof is rendered ineffective or invalid such (d) Severability. If any provision hereof is rendered ineffective or invalid, such provision shall not invalidate any other provision. (e) <u>Setoff.</u> Buyer shall have no right to set off any amounts against the amount owing in respect of this invoice. (f) As used herein, "including" means "including without limitation".

Certain Precautions on Specifications and Use

- Suitability of Use. Seller shall not be responsible for conformity with any stan-dards, codes or regulations which apply to the combination of the Good in the Buyer's application or use of the Good. At Buyer's request, Seller will provide applicable third party certification documents identifying ratings and limitations 1. of use which apply to the Good. This information by itself is not sufficient for a complete determination of the suitability of the Good 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 this Good, nor is it intended to imply that the uses listed may be suitable for this Good
 - (i) Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
 - Energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety (ii) equipment, and installations subject to separate industry or government regulations
 - (iii) Systems, machines and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to this Good

NEVER USE THE PRODUCT 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 SELLER'S PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

- Programmable Products. Seller shall not be responsible for the user's pro gramming of a programmable Good, or any consequence thereof.
- 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 Seller's test conditions, and the user must corre late it to actual application requirements. Actual performance is subject to the Seller's Warranty and Limitations of Liability. 3
- Change in Specifications. Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our prac 4 tice to change part numbers when published ratings or features are changed tice to change part numbers when published ratings or teatures are changed or when significant construction changes are made. However, some specifica tions of the Good may be changed without any notice. When in doubt, specia part numbers may be assigned to fix or establish key specifications for you application. Please consult with your Seller's representative at any time to con firm actual specifications of purchased Good. <u>Errors and Omissions</u>. The information in this catalog has been carefully checked and is believed to be accurate; however, no responsibility is assumed for algorithm to the proformation of the accurate in the second s
- 5. for clerical, typographical or proofreading errors, or omissions.

Complete "Terms and Conditions of Sale" for product purchase and use are on Omron's website at www.omron.com/oei – under the "About Us" tab, in the Legal Matters section.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

OMRON ELECTRONICS LLC

One Commerce Drive Schaumburg, IL 60173

847-843-7900

For US technical support or other inquiries: 800-556-6766

04/05

Cat. No. E224-E3-04

OMRON CANADA, INC. 885 Milner Avenue Toronto, Ontario M1B 5V8 416-286-6465 OMRON ON-LINE

Global - http://www.omron.com USA - http://www.omron.com/oei Canada - http://www.omron.ca

Specifications subject to change without notice

Printed in USA