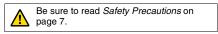
Oil-resistant, Long-range Photoelectric Sensor with Metal Housing

E3S-C

Water- and Oil-resistant Photoelectric Sensor with Metal Housing Used for Longrange Sensing

- Excellent resistance against the water and oil. Easy application in locations with oil mist.
- Long-range sensing up to 30 m with Through-beam models.
- Shock resistance rated at 1,000m/s².
- Product lineup includes metal M12 pre-wired connector models.
- NPN/PNP selector switch output.



Ordering Information



For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

Sensing method	Appearance	Connection method	Sen	ising di	stance	Model	
	Horizontal	Pre-wired				E3S-CT11 2M Emitter E3S-CT11-L 2M Receiver E3S-CT11-D 2M	
Through-beam	æ; <u></u> ;→; <u></u> ;-	Pre-wired Connector (M12)			30 m	E3S-CT11-M1J 0.3M Emitter E3S-CT11-L-M1J 0.3M Receiver E3S-CT11-D-M1J 0.3M	
Emitter + Receiver) *	Vertical	Pre-wired			30 III	E3S-CT61 2M Emitter E3S-CT61-L 2M Receiver E3S-CT61-D 2M	
		Pre-wired Connector (M12)				E3S-CT61-M1J 0.3M Emitter E3S-CT61-L-M1J 0.3M Receiver E3S-CT61-D-M1J 0.3M	
	Horizontal	Pre-wired				E3S-CR11 2M	
Retro-reflective		Pre-wired Connector (M12)		3 r		E3S-CR11-M1J 0.3M	
Relio-reliective	Vertical	Pre-wired		51		E3S-CR61 2M	
		Pre-wired Connector (M12)				E3S-CR61-M1J 0.3M	
		Pre-wired	700) mm		E3S-CD11 2M	
	Horizontal	Fie-wiled		2 m		E3S-CD12 2M	
Diffuse-reflective	a;] ←	Pre-wired Connector (M12)	700) mm		E3S-CD11-M1J 0.3M	
		Fre-wired Connector (W12)		2 m		E3S-CD12-M1J 0.3M	
		Pre-wired	700) mm		E3S-CD61 2M	
	Vertical	Fie-wileu		2 m		E3S-CD62 2M	
		Pro wired Copportor (M10)	700) mm		E3S-CD61-M1J 0.3M	
		Pre-wired Connector (M12)		2 m		E3S-CD62-M1J 0.3M	

* Through-beam Sensors are normally sold in sets that include both the Emitter and Receiver.

Accessories (Order Separately) Slits (A Slit is not provided with Through-beam Sensors. Order a Slit separately if required.) (Refer to *Dimensions* on page 10.)

Slit width	Sensing distance	Minimum detect- able object (reference value)	Model	Quantity	Remarks
0.5 mm imes 11 mm	1.8 m	0.5-mm dia.		-S61 1 set each for Emitter and Re- ceiver (8 Slits total)	(Snap-in Long Slit) Can be used with the E3S-CT⊡1(-M1J) Through-beam Sensor. Refer to page 10.
$1 \text{ mm} \times 11 \text{ mm}$	3.5 m	1-mm dia.	E39-S61		
$2 \text{ mm} \times 11 \text{ mm}$	7 m	2-mm dia.	239-301		
$4 \text{ mm} \times 11 \text{ mm}$	15 m	2.6-mm dia.			

Reflectors (A Reflector is required for each Retro-reflective Sensor.) The E39-R1 Reflector is provided with the Sensor. Order other Reflectors separately if required. (Refer to *Dimensions* on *E39-L/E39-S/E39-R*.)

Name	Sensing	Model	Quantity	Remarks		
Name	Rated value	Reference value	Model	Quantity	nemarks	
Reflectors	3 m		E39-R1	1	Provided with the E3S-CRD1 (-M1J) Retro-reflective Sensor.	
nellectors		4 m	E39-R2	1		
Small Reflectors		1.5 m	E39-R3	1		
		750 mm	E39-R4	1		
		700 mm (50 mm)*	E39-RS1	1		
Tape Reflectors		1,100 mm (100 mm)*	E39-RS2	1	Enables MSR function.	
		1,400 mm (100 mm)*	E39-RS3	1		

Note: 1. If you use any Reflector other than the enclosed Reflector, make sure that the stability indicator lights properly when you set the Sensor.

Refer to Reflectors on E39-L/E39-S/E39-R for details.

 * Values in parentheses indicate the minimum distance required between the Sensor and Reflector.

Mounting Brackets

Some Mounting Brackets are provided with the Sensor. Order other Mounting Brackets separately if required. (Refer to Dimensions on E39-L/E39-S/E39-R.)

Appearance	Model	Quantity	Remarks
	E39-L102	1	Provided with Horizontal Models.
A F	E39-L103	1	Provided with Vertical Models.
	E39-L85	1	Mounting bracket for changing from E3S-
A B B B B B B B B B B B B B B B B B B B	E39-L86	1	Mounting bracket for changing from E3S-
	E39-L87	1	

Note: 1. When using a Through-beam Sensor, order one Connector for the Receiver and one for the Emitter. 2. Refer to *Mounting Brackets* on *E39-L/F39-L/E39-S/E39-R* for details.

Sensor I/O Connectors (Sockets on One Cable End)

(Models with Pre-wired Connectors: A Connector is not provided with the Sensor. Be sure to order a Connector separately.) (Refer to Dimensions on XS2.)

Cable	Appearance	Cable type		Model
	Straight	2 m		XS2F-D421-DC0-F
Fire-retardant,		5 m	3-wire	XS2F-D421-GC0-F
robot cable	L-shape	2 m	3-wire	XS2F-D422-DC0-F
	L-shape	5 m	-	XS2F-D422-GC0-F

Note: 1. When using a Through-beam Sensor, order one Connector for the Receiver and one for the Emitter.

2. For details on Sensor I/O Connectors and cables such as vibration-proof robot cables, refer to Introduction to Sensor I/O Connectors/Sensor Controllers.

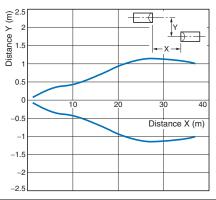
Ratings and Specifications

Sensing method		Through-beam	Retro-reflective (with M.S.R. function) *1	Diffuse	e reflective			
	Madal	Horizontal E3S-CT11(-M1J)	Horizontal E3S-CR11(-M1J)	Horizontal E3S-CD11(-M1J)	Horizontal E3S-CD12(-M1J)			
Item	Model	Vertical E3S-CT61(-M1J)	Vertical E3S-CR61(-M1J)	Vertical E3S-CD61(-M1J)	Vertical E3S-CD62(-M1J)			
Sensing d	listance	30 m	3 m (when using E39-R1)	700 mm $(300 \times 300 \text{ mm} \text{ white paper})$	2 m (300 \times 300 mm white paper)			
Standard sensing object		Opaque, 15-mm dia. min.	Opaque, 75-mm dia. min.					
Differentia	al travel			20% max. of sensing dista	ince			
Directiona	al angle	Emitter and Receiver: 3° to 15°	3° to 10°					
Light sou (waveleng		Infrared LED (880 nm)	Red LED (700 nm)	Infrared LED (880 nm)				
Power su	oply voltage	10 to 30 VDC including 10% (p.p) ripple					
Current co	onsumption	50 mA max. (Emitter 25 mA max. Receiver 25 mA max.)	40 mA max.					
Control o	utput	Load power supply voltage: 3 Load current: 100 mA max. (F Open controller output (NPN/I Light-ON/Dark-ON selectable	Residual voltage: NPN output: ⁻ PNP selectable)	1.2 V max., PNP output: 2.0	V max.)			
			Power supply reverse polarity Mutual interference prevention	ity protection, Output short-circuit protection, ion				
Response	time	Operate or reset: 1 ms max.			Operate or reset 2 ms max			
Sensitivity adjustmer		One-turn adjuster		Two-turn endless adjuster	with an indicator			
Ambient i (Receiver	llumination side)	Incandescent lamp: 5,000 lx n Sunlight: 10,000 lx max.	nax.					
Ambient t range	emperature	Operating: -25°C to 55°C, Sto	prage: –40°C to 70°C (with no i	icing or condensation)				
Ambient h range	numidity	Operating: 35% to 85%, Stora	age: 35% to 95% (with no cond	ensation)				
Insulation	resistance	20 MΩ min. (at 500 VDC)						
Dielectric	strength	1,000 VAC, 50/60 Hz for 1 min	VAC, 50/60 Hz for 1 min					
Vibration	resistance	Destruction: 10 to 2,000 Hz, 1.5-mm double amplitude or 300 m/s ² for 0.5 hours each in X, Y, and Z directions						
Shock res	istance	Destruction: 1,000 m/s ² 3 times each in X, Y, and Z directions						
Degree of	protection	IEC 60529: IP67 (in-house standards: oil-resistant), NEMA: 6P (indoors only) *2						
Connectio	on method	Pre-wired (standard cable leng	gth: 2 m) or Pre-wired M12 Co	nnector (standard cable len	gth: 0.3 m)			
Weight (packed state)		Approx. 270 g (Pre-wired cable) Approx. 230 g (Pre-wired Connector (M12))	Approx. 160 g (Pre-wired cable) Approx. 130 g (Pre-wired Connector (M12))	Approx. 150 g (Pre-wired cable) Approx. 110 g (Pre-wired Connector (M12))				
	Case	Zinc die-cast	1	1				
Motorial	Operation panel cover	PES (polyether sulfone)						
Material	Lens	Methacrylic resin						
-	Mounting	Stainless steel (SUS304)						
	Bracket	Stallliess steel (SUSS04)						

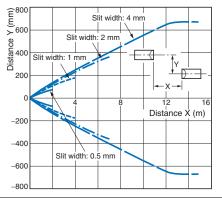
*1. Refer to *MSR function* of *Technical Guide (Technical version).* *2. NEMA: National Electrical Manufactures Association

Parallel Operating Range

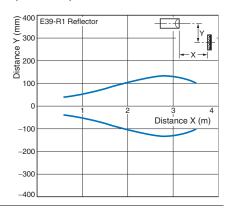
Through-beam E3S-CT
(-M1J)



Through-beam E3S-CT□ (-M1J) + E39-S61 Slit (Order Separately)



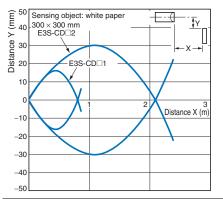
Retro-reflective E3S-CR□1 (-M1J) + E39-R1 Reflector (Provided)



Operating Range

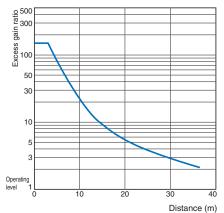
Diffuse-reflective

E3S-CD (-M1J)

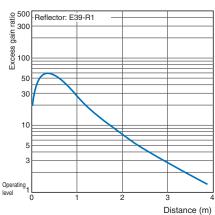


Excess Gain vs. Set Distance

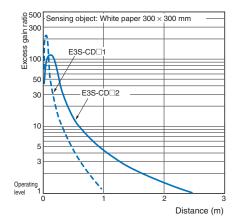
Through-beam E3S-CT□1 (-M1J)



Retro-reflective E3S-CR□1 (-M1J) + E39-R1 Reflector (Provided)



Diffuse-reflective E3S-CD (-M1J)



I/O Circuit Diagrams

NPN Output

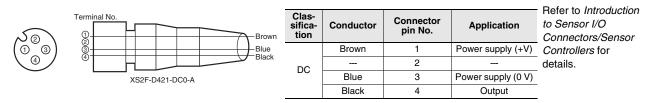
Model	Operation mode	Timing charts	Operation selector	Output circuits
E3S-CT11(-M1J) *	Light-ON	Incident light No incident light Light indicator ON (Red) OFF Output ON transistor OFF Load Operate (e.g. relay) Reset Between brown ① and black ④ leads)	L side (LIGHT ON)	Through-beam Model Receivers: Retro-reflective Models, Reflective Models
E3S-CT61(-M1J) * E3S-CR61(-M1J) E3S-CR61(-M1J) E3S-CD11(-M1J) E3S-CD12(-M1J) E3S-CD61(-M1J) E3S-CD62(-M1J)	Dark-ON	Incident light No incident light Light indicator ON (Red) OFF Output ON transistor OFF Load Operate (e.g. relay) Reset (Between brown ① and black ④ leads)	D side (DARK ON)	* Set the NPN or PNP selector to NPN. Connector Pin Arrangement
	Through-beam	Model Emitters	Brown	Connector Pin Arrangement

PNP Output

Model	Operation mode	Timing charts	Operation selector	Output circuits
E3S-CT11(-M1J) *	Light-ON	Incident light No incident light Light indicator ON (Red) OFF Output transistor OFF Load Operate (e.g. relay) Reset (Between blue ③ and black ④ leads)	L side (LIGHT ON)	Through-beam Model Receivers: Retro-reflective Models, Reflective Models
E3S-CT61(-M1J) * E3S-CR11(-M1J) E3S-CR61(-M1J) E3S-CD11(-M1J) E3S-CD12(-M1J) E3S-CD61(-M1J) E3S-CD62(-M1J)	Dark-ON	Incident light No incident light Light indicator ON (Red) OFF Output ON Load Operate (e.g. relay) Reset (Between blue ③ and black ④ leads)	D side (DARK ON)	* Set the NPN or PNP selector to NPN. Connector Pin Arrangement
	Through-beam	Model Emitters	Blue I≺	Connector Pin Arrangement 10 to 30 VDC Note: Pins 2 and 4 are not used.

* Models numbers for Through-beam Sensors (E3S-CT11(-M1J)) are for sets that include both the Emitter and Receiver. The model number of the Emitter is expressed by adding "-L" to the set model number (example: E3S-CT11-L 2M), the model number of the Receiver, by adding "-D" (example: E3S-CT11-D 2M.) Refer to *Ordering Information* to confirm model numbers for Emitter and Receivers.

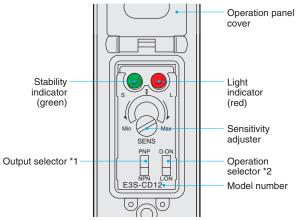
Plug (Sensor I/O Connector)



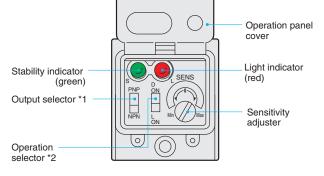
Note: Pin 2 is not used.

Nomenclature

Horizontal Model



Vertical Model



Note: The sensitivity adjuster on Through-beam and Retro-reflective Models is different.

*1. Use the output selector to select the type of output transistor, NPN or PNP. *2. Use the operation selector to select the operation mode.

Safety Precautions

Refer to Warranty and Limitations of Liability.

WARNING

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



Precautions for Correct Use

Do not use the product in atmospheres or environments that exceed product ratings.

• Wiring

Cable

- The E3S-C uses an oil-resistive cable to ensure oil resistivity.
- Do not allow the cable to be bent to a radius of less than 25 mm.

Mounting

Mounting

- When mounting the E3S-C, do not hit the E3S-C with a hammer, or the E3S-C will loose watertightness.
- Use M4 screws to mount the E3S-C. The tightening torque of each screw must be 1.18 N·m maximum.

Mounting Bracket

- When mounting the E3S-C with the mounting bracket so that sensing objects will be in the direction of the mechanical axis, use the optical axis lock holes.
- If it is not possible to mount the E3S-C so that the sensing objects will be in the direction the mechanical axis, move the E3S-C upwards, downwards, to the left, or to the right and secure the E3S-C in the center of the range where the light indicator will be lit, at which time make sure that the stability indicator is lit.

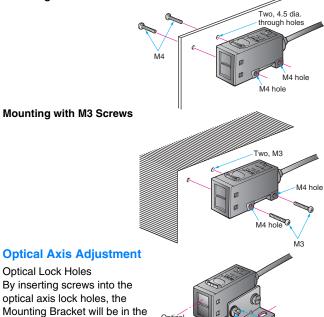
Direct Mounting

Mount the E3S-C as shown in the following illustration.

Mounting with M4 Screws

direction of the optical axis of the

E3S-C.



Optical

Mounting axis

our optical

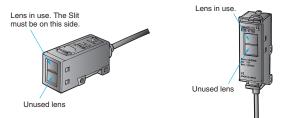
axis loc

holes (M4)

Adjusting

Optical Axis of Through-beam Sensor

The E3S-C Through-beam Models incorporates two lenses, one of which will be used as shown in the following illustration. When using a Slit, the Slit must be on the side where the lens to be used is located. Vertical Model Horizontal Model



Water Resistance

To ensure the water resistance of the E3S-C, tighten the screws of the operation panel cover to a torque of 0.34 N·m to 0.54 N·m.

Others

Oil and Chemical Resistance

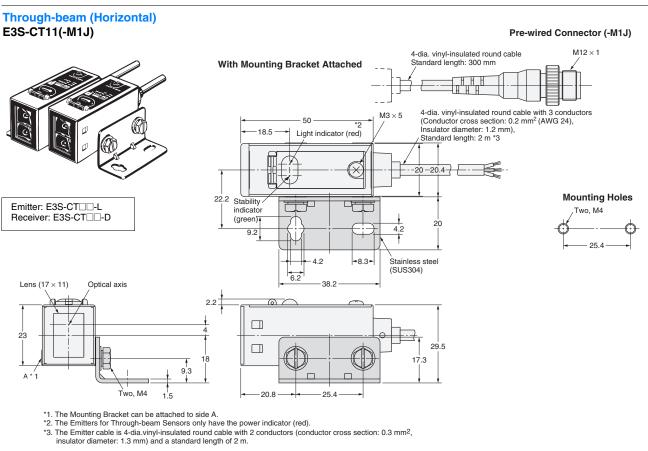
- Although the E3S-C is oil-resistance, refer to the following table before using the E3S-C in places where oil may be sprayed on the E3S-C.
- Tests were carried out with the following oils and it was certified that the E3S-C resists these oils.

Oil	Product name	Kinematic viscosity (mm ² /s (cst)) at 40°C	PH
Lubricating oil	Velocite No.3 (manufactured by Exxon Mobil)	2.02	
Water insoluble machining oil	Yushiron Oil No. 2 ac (manufactured by Yushi- ro Chemical Industry Co., Ltd.)	Less than 10	
	Yushiroken EC50T-3 (manufactured by Yushi- ro Chemical Industry Co., Ltd.)		7 to 9.5
Water soluble	Yushiron Lubic HWC68 (manufactured by Yushi- ro Chemical Industry Co., Ltd.)		7 to 9.9
machining oil	Griton 1700D (manufactured by Toho Chemical Industry Co., Ltd.)		7 to 9.2
	Yushiroken S50N (manufactured by Yushi- ro Chemical Industry Co., Ltd.)		7 to 9.8

- Note: 1. The E3S-C maintained a minimum insulation resistance of 100 $\mbox{M}\Omega$ after the E3S-C was dipped in all the above oils at a temperature of 50°C for 240 hours.
 - 2. When using the E3S-C in a place where an oil other than the ones listed above is sprayed on the E3S-C, refer to the above kinematic viscosity and ph values. The location may be suitable for the E3S-C if the kinematic viscosity and pH values of the oil are close to the above kinematic viscosity and pH values, but make sure that the oil does not contain any additive that may have a negative influence on the E3S-C.

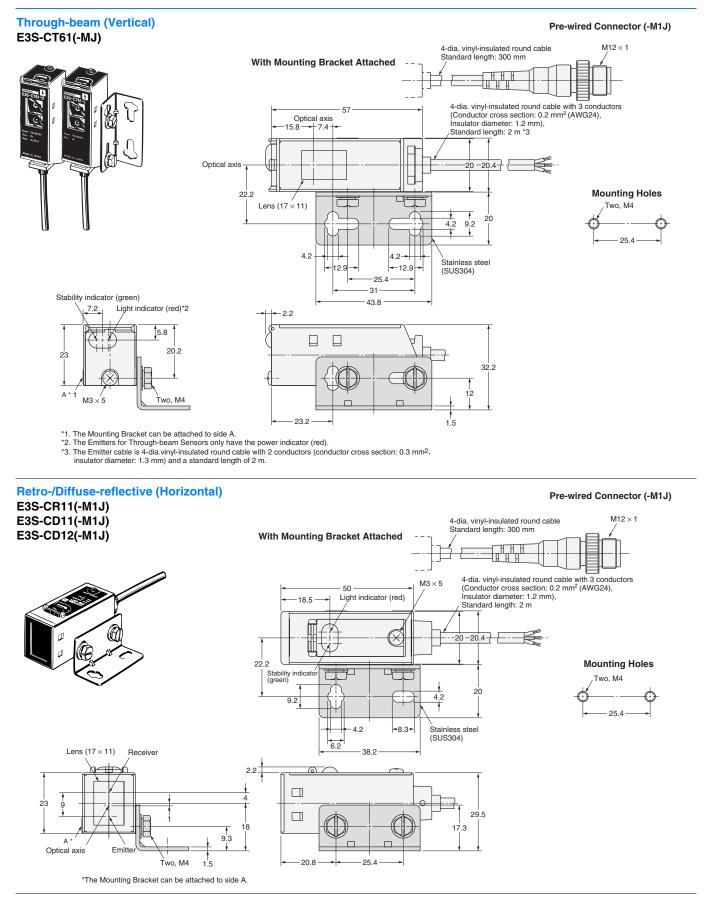
(Unit: mm) Tolerance class IT16 applies to dimensions in this datasheet unless otherwise specified.

Sensors

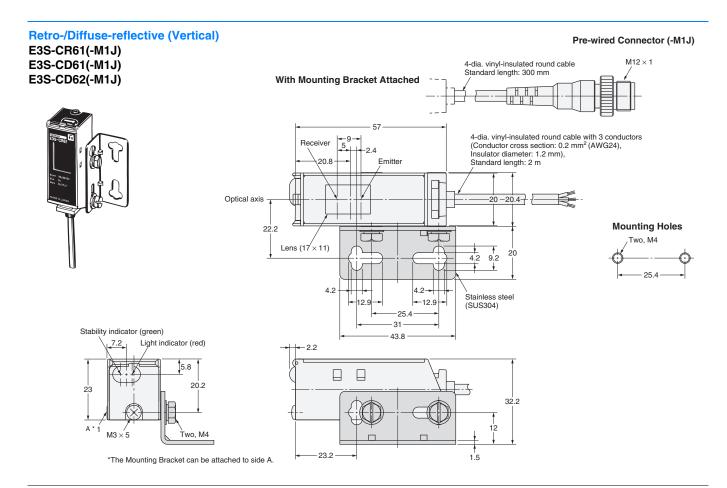


Note: Models numbers for Through-beam Sensors (E3S-CT11(-M1J)) are for sets that include both the Emitter and Receiver. The model number of the Emitter is expressed by adding "-L" to the set model number (example: E3S-CT11-L 2M), the model number of the Receiver, by adding "-D" (example: E3S-CT11-D 2M.) Refer to Ordering Information to confirm model numbers for Emitter and Receivers.

8

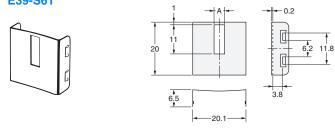


Note: Models numbers for Through-beam Sensors (E3S-CT61(-M1J)) are for sets that include both the Emitter and Receiver. The model number of the Emitter is expressed by adding "-L" to the set model number (example: E3S-CT61-L 2M), the model number of the Receiver, by adding "-D" (example: E3S-CT61-D 2M.) Refer to Ordering Information to confirm model numbers for Emitter and Receivers.



Accessories (Order Separately)

Snap-in Long Slit (For Through-beam Models) E39-S61



Dimension A (mm)	Material	Quantity
0.5		
1	Stainless	1 set each for Emitter/Receiver (8 Slits total)
2	steel	
4		(

Reflectors

Refer to *E39-L/E39-S/E39-R* for details. Mounting Brackets

Refer to E39-L/E39-S/E39-R for details.

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.

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 K35-4
 A

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 SS-12143
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