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

E3S-C

- Water- and Oil-resistive Photoelectric Sensor with Metal Housing Used for Long-range Sensing
- Satisfies the water- and oil-resistive requirements and safe enough for use in oil-mist environments.
- Long-range sensing up to 30 m with Through-beam models.
- Shock resistance rated at 1,000m/s^2 is Proximity Sensor-quality.
- Series includes pre-wired M12 metal connector models.
- NPN/PNP selector switch output.

⚠ Be sure to read *Safety Precautions* on page 6.

Ordering Information

Sensors

Red light Infrared light

Sensing method	Appearance	Connection method	Sensing distance	Model
Through-beam	Horizontal	Pre-wired	30 m	**E3S-CT11**
		Pre-wired Connector (M12)		**E3S-CT11-M1J**
	Vertical	Pre-wired		**E3S-CT61**
		Pre-wired Connector (M12)		**E3S-CT61-M1J**
Retro-reflective	Horizontal	Pre-wired	3 m	**E3S-CR11**
		Pre-wired Connector (M12)		**E3S-CR11-M1J**
	Vertical	Pre-wired		**E3S-CR61**
		Pre-wired Connector (M12)		**E3S-CR61-M1J**
Diffuse-reflective	Horizontal	Pre-wired	700 mm	**E3S-CD11**
			2 m	**E3S-CD12**
		Pre-wired Connector (M12)	700 mm	**E3S-CD11-M1J**
			2 m	**E3S-CD12-M1J**
	Vertical	Pre-wired	700 mm	**E3S-CD61**
			2 m	**E3S-CD62**
		Pre-wired Connector (M12)	700 mm	**E3S-CD61-M1J**
			2 m	**E3S-CD62-M1J**

Accessories (Order Separately)

Slits

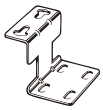
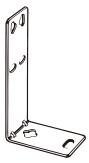
Slit width	Sensing distance	Minimum detectable object (typical)	Model	Quantity	Remarks
0.5 mm × 11 mm	1.8 m	0.5-mm dia.	**E39-S61**	1 set each for Emitter and Receiver (8 Slits total)	(Snap-in Long Slit) Can be used with the E3S-CT□1(-M1J) Through-beam Sensor. Refer to page 10.
1 mm × 11 mm	3.5 m	1-mm dia.			
2 mm × 11 mm	7 m	2-mm dia.			
4 mm × 11 mm	15 m	2.6-mm dia.			

Reflectors

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

Note: When using any reflector other than the provided one, use a sensing distance of approximately 0.7 times the typical value as a guide.
* Values in parentheses indicate the minimum distance required between the Sensor and Reflector.

Mounting Brackets

Appearance	Model	Quantity	Remarks
	**E39-L102**	1	Provided with Horizontal Models.
	**E39-L103**	1	Provided with Vertical Models.
	**E39-L85**	1	Mounting bracket for changing from E3S-□□□□□42/44 to E3S-C Vertical Models.
	**E39-L86**	1	Mounting bracket for changing from E3S-□□□□□43 to E3S-C Vertical Models.
	**E39-L87**	1	---

Note: If a Through-beam model is used, order two Mounting Brackets, one for the Emitter and one for the Receiver.

Sensor I/O Connectors

Cable	Appearance	Cable type		Model
Standard	Straight 	2 m	3-wire	**XS2F-D421-DC0-A**
		5 m		**XS2F-D421-GC0-A**
	L-shape 	2 m		**XS2F-D422-DC0-A**
		5 m		**XS2F-D422-GC0-A**

Note: For details on Sensor I/O Connectors and cables such as vibration-proof robot cables.

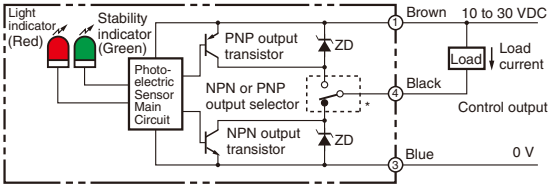
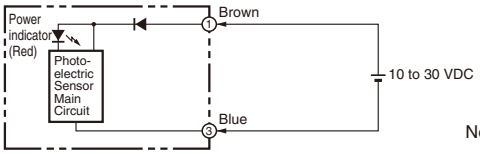
Ratings and Specifications

Item \ Sensing method		Through-beam	Retro-reflective (with M.S.R. function) *1	Diffuse reflective	
Item \ Model		Horizontal E3S-CT11(-M1J)	Horizontal E3S-CR11(-M1J)	Horizontal E3S-CD11(-M1J)	Horizontal E3S-CD12(-M1J)
		Vertical E3S-CT61(-M1J)	Vertical E3S-CR61(-M1J)	Vertical E3S-CD61(-M1J)	Vertical E3S-CD62(-M1J)
Sensing distance		30 m	3 m (when using E39-R1)	700 mm (300 × 300 mm white paper)	2 m (300 × 300 mm white paper)
Standard sensing object		Opaque, 15-mm dia. min.	Opaque, 75-mm dia. min.	---	
Differential travel		---		20% max. of sensing distance	
Directional angle		Emitter and Receiver: 3° to15°	3° to 10°	---	
Light source (wavelength)		Infrared LED (880 nm)	Red LED (700 nm)	Infrared LED (880 nm)	
Power supply voltage		10 to 30 VDC including 10% (p.p) ripple			
Current consumption		50 mA max. (Emitter 25 mA max. Receiver 25 mA max.)	40 mA max.		
Control output		Load power supply voltage: 30 VDC max. Load current: 100 mA max. (Residual voltage: NPN output: 1.2 V max., PNP output: 2.0 V max.) Open controller output (NPN/PNP selectable) Light-ON/Dark-ON selectable			
Protection circuits		Power supply reverse polarity circuit protection, Output short-circuit protection	Power supply reverse polarity protection, Output short-circuit protection, Mutual interference prevention		
Response time		Operate or reset: 1 ms max.			Operate or reset 2 ms max.
Sensitivity adjustment		One-turn adjuster		Two-turn endless adjuster with an indicator	
Ambient illumination (Receiver side)		Incandescent lamp: 5,000 lx max. Sunlight: 10,000 lx max.			
Ambient temperature range		Operating: –25°C to 55°C, Storage: –40°C to 70°C (with no icing or condensation)			
Ambient humidity range		Operating: 35% to 85%, Storage: 35% to 95% (with no condensation)			
Insulation resistance		20 MΩ min. (at 500 VDC)			
Dielectric strength		1,000 VAC, 50/60 Hz for 1 min			
Vibration resistance		Destruction: 10 to 2,000 Hz, 1.5-mm double amplitude or 300 m/s² for 0.5 hours each in X, Y, and Z directions			
Shock resistance		Destruction: 1,000 m/s² 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			
Connection method		Pre-wired (standard cable length: 2 m) or Pre-wired M12 Connector (standard cable length: 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))	
Material	Case	Zinc die-cast			
	Operation panel cover	PES (polyether sulfone)			
	Lens	Methacrylic resin			
	Mounting Bracket	Stainless steel (SUS304)			
Accessories		Mounting Bracket (with screws), Adjustment screwdriver, Instruction manual, and Reflector (only for Retro-reflective Sensors)			

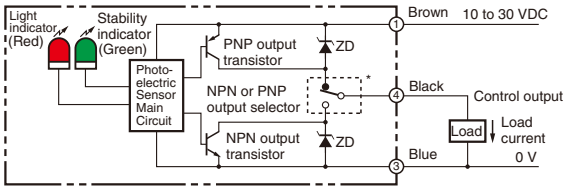
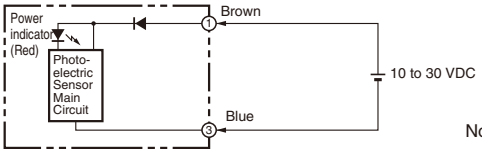
*1. Refer to *MSR function* of *Technical Guide (Technical version).*
*2. NEMA: National Electrical Manufactures Association

I/O Circuit Diagrams

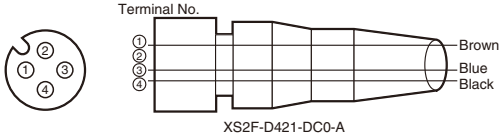
NPN Output

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

PNP Output

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

Plug (Sensor I/O Connector)



Classification	Conductor	Connector pin No.	Application
DC	Brown	1	Power supply (+V)
	---	2	---
	Blue	3	Power supply (0 V)
	Black	4	Output

Note: Pin 2 is not used.

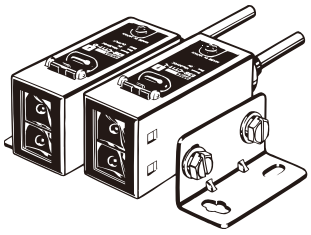
Dimensions

(Unit: mm)

Sensors

Through-beam (Horizontal)

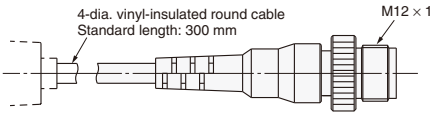
E3S-CT11(-M1J)



Emitter: E3S-CT□□-L
Receiver: E3S-CT□□-D

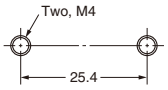
With Mounting Bracket Attached

Pre-wired Connector (-M1J)



4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.2 mm² (AWG 24), Insulator diameter: 1.2 mm), Standard length: 2 m *3

Mounting Holes

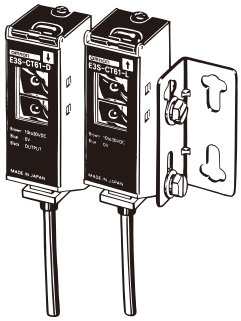


*1. The Mounting Bracket can be attached to side A.
*2. The Emitters for Through-beam Sensors only have the power indicator (red).
*3. The Emitter cable is 4-dia.vinyl-insulated round cable with 2 conductors (conductor cross section: 0.3 mm², insulator diameter: 1.3 mm) and a standard length of 2 m.

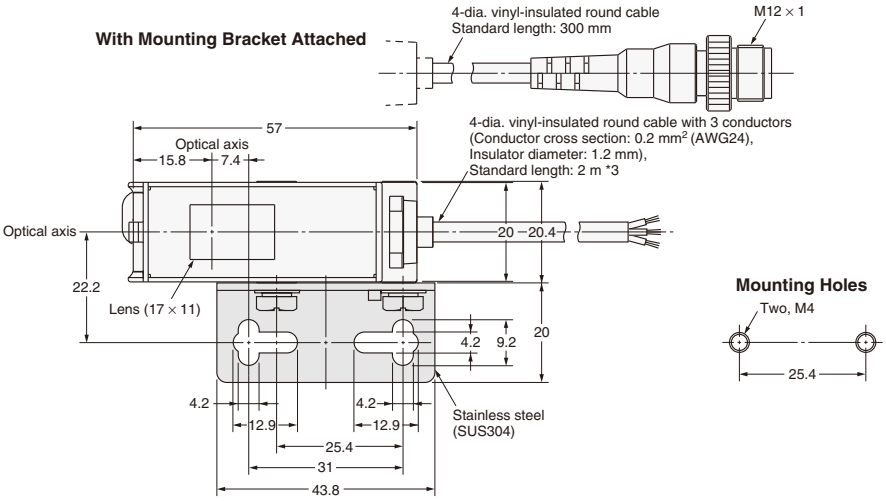
Through-beam (Vertical)

E3S-CT61(-MJ)

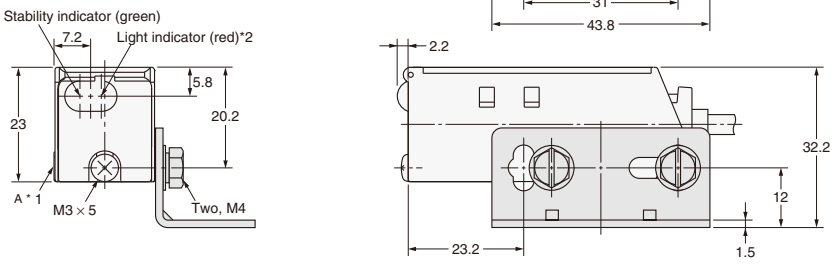
Pre-wired Connector (-M1J)



With Mounting Bracket Attached



Mounting Holes

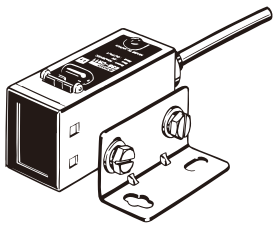


*1. The Mounting Bracket can be attached to side A.
*2. The Emitters for Through-beam Sensors only have the power indicator (red).
*3. The Emitter cable is 4-dia.vinyl-insulated round cable with 2 conductors (conductor cross section: 0.3 mm^2, insulator diameter: 1.3 mm) and a standard length of 2 m.

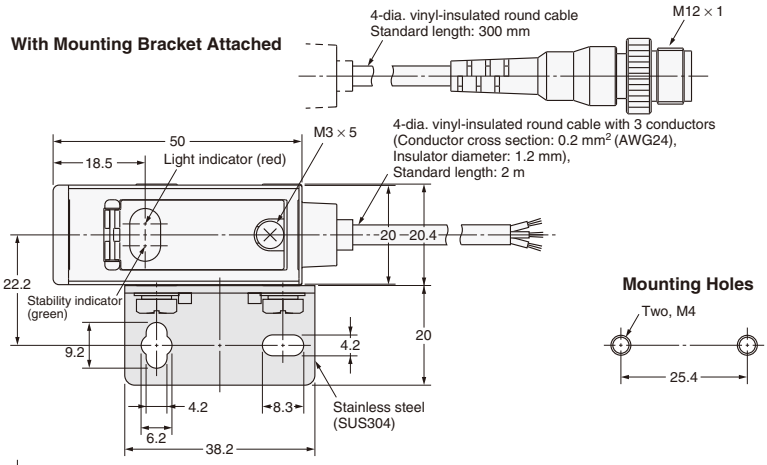
Retro-/Diffuse-reflective (Horizontal)

E3S-CR11(-M1J)
E3S-CD11(-M1J)
E3S-CD12(-M1J)

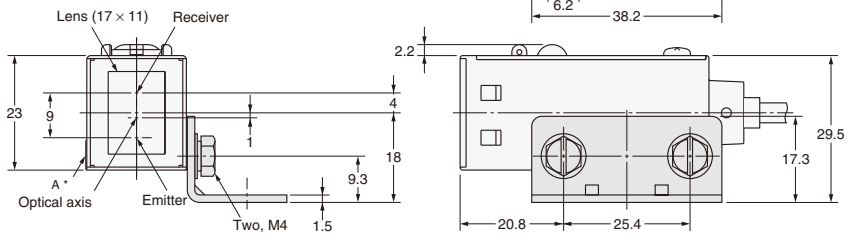
Pre-wired Connector (-M1J)



With Mounting Bracket Attached



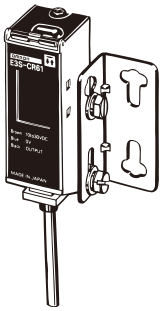
Mounting Holes



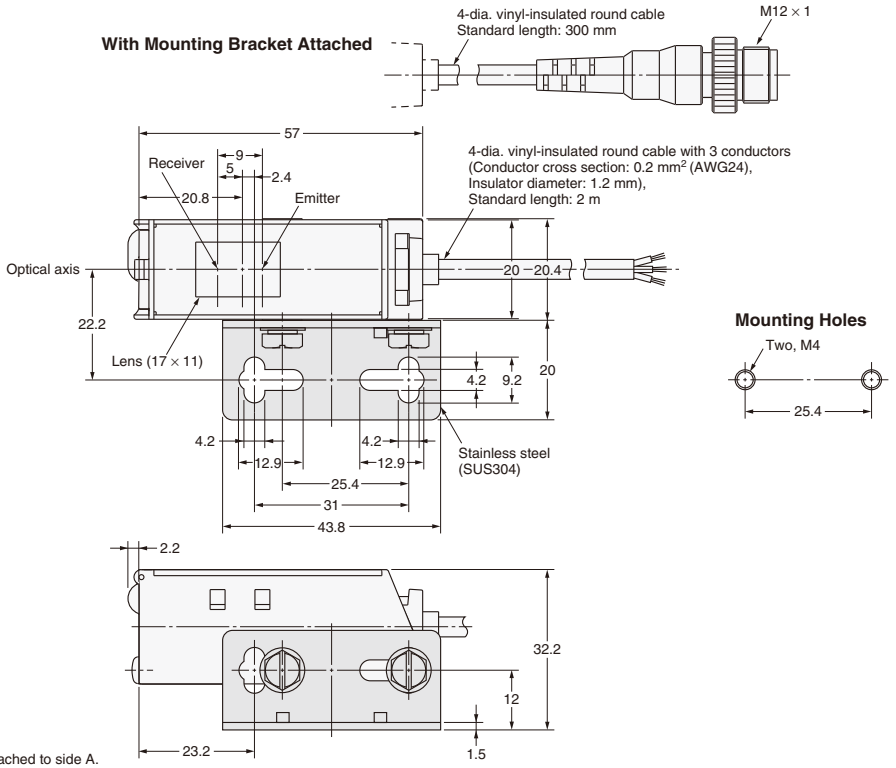
*The Mounting Bracket can be attached to side A.

Retro-/Diffuse-reflective (Vertical)

E3S-CR61(-M1J)
E3S-CD61(-M1J)
E3S-CD62(-M1J)



With Mounting Bracket Attached

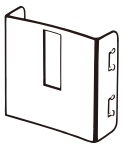


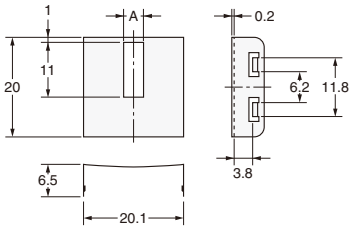
*The Mounting Bracket can be attached to side A.

Accessories (Order Separately)

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

E39-S61





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

Slits

Reflectors

Mounting Brackets