

E3S-A



Be sure to read *Safety Precautions* on page 10.

Ordering Information



Built-in Amplifier Photoelectric Sensors

Red light Infrared light

Sensing method	Appearance	Connection method	Sensing distance			Functions	Model	
							NPN output	PNP output
Through-beam Sensors *1		Pre-wired	 7 m		---	E3S-AT11 2M Emitter E3S-AT11-L Receiver E3S-AT11-D	E3S-AT31 2M Emitter E3S-AT31-L Receiver E3S-AT31-D	
		Connector (M12)			---	E3S-AT21 2M Emitter E3S-AT21-L Receiver E3S-AT21-D	E3S-AT41 2M Emitter E3S-AT41-L Receiver E3S-AT41-D	
		Pre-wired			---	E3S-AT16 Emitter E3S-AT16-L Receiver E3S-AT16-D	E3S-AT36 Emitter E3S-AT36-L Receiver E3S-AT36-D	
		Connector (M12)			---	E3S-AT61 2M Emitter E3S-AT61-L Receiver E3S-AT61-D	E3S-AT81 2M Emitter E3S-AT81-L Receiver E3S-AT81-D	
		Pre-wired			---	E3S-AT71 2M Emitter E3S-AT71-L Receiver E3S-AT71-D	E3S-AT91 2M Emitter E3S-AT91-L Receiver E3S-AT91-D	
		Connector (M12)			---	E3S-AT66 Emitter E3S-AT66-L Receiver E3S-AT66-D	E3S-AT86 Emitter E3S-AT86-L Receiver E3S-AT86-D	
Retro-reflective Sensors		Pre-wired	 2 m (100 mm)		---	E3S-AR11 2M	E3S-AR31 2M	
		Connector (M12)			---	E3S-AR21 2M	E3S-AR41 2M	
		Pre-wired			---	E3S-AR16	E3S-AR36	
		Connector (M12)			---	E3S-AR61 2M	E3S-AR81 2M	
		Pre-wired			---	E3S-AR71 2M	E3S-AR91 2M	
		Connector (M12)			---	E3S-AR66	E3S-AR86	

*1. Through-beam Sensors are normally sold in sets that include both the Emitter and Receiver. Orders for individual Emitters and Receivers are accepted.

*2. Values in brackets are the minimum required distance between the Sensor and Reflector.

Sensing method	Appearance	Connection method	Sensing distance	Functions	Model		
					NPN output	PNP output	
Diffuse-reflective Sensors	Horizontal 	Pre-wired	100 mm (wide view)	---	E3S-AD13 2M	E3S-AD33 2M	
			200 mm	Timer Self Diagnosis	E3S-AD23 2M	E3S-AD43 2M	
			700 mm	---	E3S-AD11 2M	E3S-AD31 2M	
		Connector (M12)	100 mm (wide view)	---	E3S-AD18	E3S-AD38	
			200 mm	---	E3S-AD16	E3S-AD36	
			700 mm	---	E3S-AD17	E3S-AD37	
		Vertical 	Pre-wired	100 mm (wide view)	---	E3S-AD63 2M *3	E3S-AD83 2M
				200 mm	Timer Self Diagnosis	E3S-AD73 2M	E3S-AD93 2M
				700 mm	---	E3S-AD61 2M	E3S-AD81 2M
	Connector (M12)		100 mm (wide view)	---	E3S-AD68	E3S-AD88	
			200 mm	---	E3S-AD66	E3S-AD86	
			700 mm	---	E3S-AD67	E3S-AD87	
	Pre-wired		200 mm	Timer Turbo Self Diagnosis	E3S-AD71 2M	E3S-AD91 2M	
			700 mm	---	E3S-AD62 2M	E3S-AD82 2M	
			700 mm	Timer Self Diagnosis	E3S-AD72 2M	E3S-AD92 2M	

*3. The following models are available with 200-mm sensing distances: E3S-AD64.

Accessories (Order Separately)

Insert-type Long Slit

Slit width	Sensing distance	Minimum sensing object (typical)	Model	Quantity	Remarks
0.5 mm × 11.1 mm	500 mm	0.2-mm dia.	E39-S46	1 of each for Emitter/Receiver (4 Slits total)	Slits can be used with the E3S-AT□□ Through-beam Sensor. → Page 10
1 mm × 11.1 mm	1.1 m	0.4-mm dia.		1 of each for Emitter/Receiver (2 Slits total)	
2 mm × 13.6 mm	2.5 m	0.8-mm dia.			

Mutual Interference Prevention Filters

Sensing distance	Model	Quantity	Remarks
2.4 m	E39-E6	2 of each for Emitter/Receiver (4 Filters total)	Can be used with the E3S-AT□□ Through-beam Sensor. → Page 11


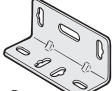
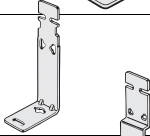




Reflectors/Other Accessories

Name	Sensing distance (typical)	Model	Quantity	Remarks
Reflectors	2 m (100 mm) * (rated value)	E39-R1	1	Provided with E3S-AR□□ Retro-reflective Sensor.
Small Reflectors	1.3 m (100 mm) *	E39-R3	1	---
	600 mm (70 mm) *	E39-R4	1	---
Tape Reflectors	450 mm (100 mm) *	E39-RS1	1	Enables MSR function.
	700 mm (100 mm) *	E39-RS2	1	
	900 mm (100 mm) *	E39-RS3	1	
Optical Axis Confirmation Reflector	---	E39-R5	1	Used to check optical axis for the E3S-AT□□ Through-beam Sensor.

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 brackets are the minimum required distance between the Sensor and Reflector.

Mounting Brackets/Other



Appearance	Model	Quantity	Remarks
	E39-L69	1	Provided with E3S-A Horizontal Sensors.
	E39-L70	1	Provided with E3S-A Vertical Sensors.
	E39-L59	1	Provided with E3S-A Vertical Pre-wired Sensors.
	E39-L81	1	Provided with E3S-A Vertical Connector Sensors.
	E39-L97	1	Protective Cover for Horizontal Sensors Note: When mounting Sensors with Connectors, the Sensor I/O Connector will come into contact with the Bracket. Mount the Sensor with care.
	E39-L98	1	Protective Cover for Vertical Sensors Note: Cannot be used with Sensors with Connectors.
	E39-L60	1	Close Mounting Plate: Provided with E3S-A Connector Sensors.

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

Sensors I/O Connectors

Model	Quantity	Remarks
E39-G2	1	Provided with product.

Sensors I/O Connectors

Cable	Appearance	Cable type		Model
Standard	Straight 	2 m	3-wire	XS2F-D421-DC0-F
		5 m		XS2F-D421-GC0-F
	L-shaped 	2 m		XS2F-D422-DC0-F
		5 m		XS2F-D422-GC0-F

Note: When using Through-beam models, order one connector for the Receiver and one for the Emitter.

Ratings and Specifications

Sensing method		Through-beam Sensors	Retro-reflective Sensors (with MSR function)	Diffuse-reflective Sensors		
Item	Model	E3S-AT11, 16, 21, 31, 36, 41, 61, 66, 71, 81, 86, 91	E3S-AR11, 16, 21, 31, 36, 41, 61, 66, 71, 81, 86, 91	E3S-AD13, 18, 23, 33, 38, 43, 63, 68, 73, 83, 88, 93	E3S-AD11, 16, 21, 31, 36, 41, 61, 66, 71, 81, 86, 91	E3S-AD12, 17, 22, 32, 37, 42, 62, 67, 72, 82, 87, 92
Sensing distance		7 m	2 m (100 mm) *1 (When using E39-R1)	100 mm (wide view) (white paper 100 × 100 mm)	10 to 200 mm (white paper 100 × 100 mm)	700 mm (white paper 200 × 200 mm)
Standard sensing object		Opaque: 10-mm dia. min.	Opaque: 75-mm dia. min.	---		
Differential travel		---		20% max. of sensing distance	10% max. of sensing distance	20% max. of sensing distance
Directional angle		Both Emitter and Receiver: 3° to 15°	3 to 10°	---		
Light source (wavelength)		Red LED (700 nm)		Infrared LED (880 nm)	Red LED (700 nm)	Infrared LED (880 nm)
Power supply voltage		10 to 30 VDC, including ripple (p-p) 10%				
Current consumption		Both Emitter and Receiver: 20 mA max. (plus approx. 15 mA with turbo function)	30 mA max. (plus approx. 15 mA with turbo function)	35 mA max.	30 mA max. (plus approx. 15 mA with turbo function)	35 mA max.
Control output		Load power supply voltage: 30 VDC max., Load current: 100 mA max. (residual voltage: 1 V max.) Open-collector output (NPN or PNP depending on model), Light-ON/Dark-ON selectable				
Self-diagnostic output (Only on Sensors with self-diagnostic outputs)		(Only Sensors with self-diagnostic function) Load power supply voltage: 30 VDC max., Load current: 50 mA max. (residual voltage: 1 V max.), Open-collector output (NPN or PNP depending on model)				
External diagnostic input (Only on Sensors with external diagnostic outputs)	Input voltage	NPN with Emitter OFF: 0 V short-circuit or 1.5 V max. (source current: 1 mA max.) with Emitter ON: Open (leakage current: 0.1 mA max.) PNP with Emitter OFF: +DC short-circuit or -1.5 VDC max. (sink current: 3 mA max.) with Emitter ON: Open (leakage current: 0.1 mA max.)		---		
	Response time	0.5 ms max.				
Protection circuits		Power supply reverse polarity protection, Output short-circuit protection	Power supply reverse polarity protection, Output short-circuit protection, Mutual interference prevention			
Response time		Operation or reset: 0.5 ms max.				
Sensitivity adjustment		Two-turn endless adjuster with an indicator				
Timer function (Only on Sensors with the timer function)		0 to 100 ms OFF-delay variable adjuster				
Turbo function (Only on Sensors with the turbo function)		Yes (with turbo switch)				---
Ambient illumination (Receiver side)		Incandescent lamp: 5,000 lx max. Sunlight: 10,000 lx max.				
Ambient temperature		Operating: -25°C to 55°C (with no icing or condensation) Storage: -40°C to 70°C (with no icing or condensation)				
Ambient humidity		Operating: 35% to 85% (with no condensation) Storage: 35% to 95% (with no condensation)				
Insulation resistance		20 MΩ min. at 500 VDC between current-carrying parts and case				
Dielectric strength		1,000 VAC, 50/60 Hz for 1 min. between current-carrying parts and case				
Vibration resistance (destruction)		10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions				
Shock resistance (destruction)		Destruction: 500m/s ² , 3 times each in X, Y, and Z directions				
Degree of protection		IEC IP67; NEMA: 4X (indoors only) *2				
Connection method		Pre-wired (standard length: 2 m) or M12 connector				
Weight (packed state)		Pre-wired cable: Approx. 150 g Connector: Approx. 70 g	Pre-wired cable: Approx. 110 g Connector: Approx. 60 g	Pre-wired cable: Approx. 90 g Connector: Approx. 50 g		
Material	Case	PBT				
	Lens	Denatured polyallylate				
	Mounting Bracket	Stainless steel (SUS304)				
Accessories		Mounting bracket (with screws), Sensitivity adjustment driver, Sensitivity adjusting knob, Instruction sheet, Close mounting plate (only for Sensors with connectors), and Reflector (only for Retro-reflective Sensors)				

*1. Values in brackets are the minimum required distance between the Sensor and Reflector.

*2. National Electrical Manufacturers Association