

Built-in Amplifier Photoelectric Sensor

E3S-A

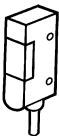
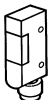
E3S-A



Ordering Information

E3S-A General-purpose Sensors

Connections	Appearance	Sensing method	Sensing distance	Operating modes	Output / timer functions	Model	
						NPN output	PNP output
Prewired		Through-beam	7 m	Light-ON Dark-ON (selectable)	---	E3S-AT11	E3S-AT31
					With timer and self-diagnostic functions	E3S-AT21	E3S-AT41
		Retroreflective	0.1 to 2 m (polarized)		---	E3S-AR11	E3S-AR31
					With timer and self-diagnostic functions	E3S-AR21	E3S-AR41
		Diffuse reflective	10 cm (light source: infra-red)		---	E3S-AD13	E3S-AD33
					With timer and self-diagnostic functions	E3S-AD23	E3S-AD43
			20 cm		---	E3S-AD11	E3S-AD31
					With timer and self-diagnostic functions	E3S-AD21	E3S-AD41
			70 cm (light source: infra-red)		---	E3S-AD12	E3S-AD32
					With timer and self-diagnostic functions	E3S-AD22	E3S-AD42

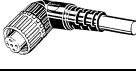
Connections	Appearance	Sensing method	Sensing distance	Operating modes	Output / timer functions	Model	
						NPN output	PNP output
Prewired	Vertical 	Through-beam	7 m	Light-ON Dark-ON (selectable)	---	E3S-AT61	E3S-AT81
					With timer and self-diagnostic functions	E3S-AT71	E3S-AT91
		Retroreflective	0.1 to 2 m (polarized)		---	E3S-AR61	E3S-AR81
					With timer and self-diagnostic functions	E3S-AR71	E3S-AR91
		Diffuse reflective	10 cm (light source: infra-red)		---	E3S-AD63	E3S-AD83
					With timer and self-diagnostic functions	E3S-AD73	E3S-AD93
			20 cm		---	E3S-AD61	E3S-AD81
					With timer and self-diagnostic functions	E3S-AD71	E3S-AD91
			70 cm (light source: infra-red)		---	E3S-AD62	E3S-AD82
					With timer and self-diagnostic functions	E3S-AD72	E3S-AD92
Connector	Horizontal 	Through-beam	7 m		---	E3S-AT16	E3S-AT36
		Retroreflective	0.1 to 2 m (polarized)			E3S-AR16	E3S-AR36
		Diffuse reflective	10 cm (light source: infra-red)			E3S-AD18	E3S-AD38
			20 cm			E3S-AD16	E3S-AD36
			70 cm (light source: infra-red)			E3S-AD17	E3S-AD37
	Vertical 	Through-beam	7 m		---	E3S-AT66	E3S-AT86
		Retroreflective	0.1 to 2 m (polarized)			E3S-AR66	E3S-AR86
		Diffuse reflective	10 cm (light source: infra-red)			E3S-AD68	E3S-AD88
			20 cm			E3S-AD66	E3S-AD86
			70 cm (light source: infra-red)			E3S-AD67	E3S-AD87

Accessories (Order Separately)

E3S-A General-purpose Sensor Accessories

Name	Model	Remarks
Slit for Through-beam Sensor	E39-S46	2 mm, 1 mm, and 0.5 mm slits are sold in pairs, one each for the receiver and emitter of a through-beam model
Mounting Bracket for Vertical Sensor	E39-L59	Purchase two brackets for each through-beam model
	E39-L81	
Filter for Mutual Interference Prevention (for Through-beam Sensor)	E39-E6	4 filters are sold together for two through-beam models (2 filters each for the emitters and receivers)
Reflector for Optical Axis Adjustment (for Through-beam Sensor)	E39-R5	One only

Plugs (for Sensors with Connector Terminals)

Cord	Appearance		Cord length	Model
Standard	Straight (3 conductor)		2 m	XS2F-D421-DC0-A
			5 m	XS2F-D421-GC0-A
	L-shape (3 conductor)		2 m	XS2F-D422-DC0-A
			5 m	XS2F-D422-GC0-A
Robot (vibration-proof)	Straight (4 conductor)		2 m	XS2F-D421-D80-R
			5 m	XS2F-D421-G80-R
	L-shape (4 conductor)		2 m	XS2F-D422-D80-R
			5 m	XS2F-D422-G80-R

Reflectors

Name	Model	Remarks
Mini-reflector	E39-R4	One
Small Reflector	E39-R3	One
Reflector Tape	E39-RS1, RS2, RS3	One (sealed type)

Specifications

Without self-diagnostic functions

Sensing method		Through-beam, Retro-reflective (polarized)	Diffuse reflective: 10 cm	Diffuse reflective: 20 cm	Diffuse reflective: 70 cm
Model	NPN output	E3S-AT11, -AR11 E3S-AT16, -AR16 E3S-AT61, -AR61 E3S-AT66, -AR66	E3S-AD13 E3S-AD63 E3S-AD18 E3S-AD68	E3S-AD11 E3S-AD16 E3S-AD61 E3S-AD66	E3S-AD12 E3S-AD17 E3S-AD62 E3S-AD67
	PNP output	E3S-AT31, -AR31 E3S-AT36, -AR36 E3S-AT81, -AR81 E3S-AT86, -AR86	E3S-AD33 E3S-AD83 E3S-AD38 E3S-AD88	E3S-AD31 E3S-AD36 E3S-AD81 E3S-AD86	E3S-AD32 E3S-AD37 E3S-AD82 E3S-AD87
Wavelength of LED light source		700 nm (red)	880 nm (infrared)	700 nm (red)	880 nm (infrared)
Sensitivity adjustment		Two-turn (endless) sensitivity adjustor with indicator			
Self-diagnostic functions		---			
Timer		---			
Turbo function		---			
Method of connection		Prewired / connector			
Weight		Prewired type: 60 g; connector type: 11 g			
Operation mode		Dark-ON or Light-ON (switchable)			
Output		Open collector current output (NPN or PNP)			
Circuit protection		Load short-circuit protection, reverse connection protection, mutual interference prevention (except for through-beam models)			
Indicators		Light indicator (red) and stability indicator (green); emission indicator (red) for the emitter of through-beam models			
Materials		Case: Polybutylene terephthalate Lens: Denaturated polyallalate Mounting bracket: Stainless steel (SUS304)			
Attachments		Mounting bracket, sensitivity adjustor knob, screws, sensitivity adjustor cover, close-mounting plate (only for Sensors with connector terminals) and reflector (E39-R1: only for retroreflective Sensors)			

With self-diagnostic functions

Sensing method		Through-beam, Retroreflective (polarized)	Diffuse reflective: 10 cm	Diffuse reflective: 20 cm	Diffuse reflective: 70 cm
Model	NPN output	E3S-AT21 E3S-AR21 E3S-AT71 E3S-AR71	E3S-AD23 E3S-AD73	E3S-AD21 E3S-AD71	E3S-AD22 E3S-AD72
	PNP output	E3S-AT41 E3S-AR41 E3S-AT91 E3S-AR91	E3S-AD43 E3S-AD93	E3S-AD41 E3S-AD91	E3S-AD42 E3S-AD92
Wavelength of LED light source		700 nm (red)	880 nm (infrared)	700 nm (red)	880 nm (infrared)
Sensitivity adjustment		Two-turn (endless) sensitivity adjustor with indicator			
Self-diagnostic functions		Self-diagnostic output, External diagnostic input	Self-diagnostic output		
Timer		0 to 100 ms OFF-delay variable adjustor			
Turbo function		Yes (with turbo switch)			---
Method of connection		Prewired			
Weight		60 g			
Operation mode		Dark-ON or Light-ON (switchable)			
Output		Open collector current output (NPN or PNP)			
Circuit protection		Load short-circuit protection, reverse connection protection, mutual interference prevention (except for through-beam models) functions			
Indicators		Light indicator (red) and stability indicator (green); emission indicator (red) for the emitter of the through-beam model			
Materials		Case: Lens: Mounting bracket:	Polybutylene terephthalate Denaturated polyallalate Stainless steel (SUS304)		
Attachments		Mounting bracket, sensitivity adjustor knob, screws, sensitivity adjustor cover, close-mounting plate (only for Sensors with connector terminals) and reflector (E39-R1: only for retroreflective Sensors)			

Ratings / Characteristics

Item		Through-beam	Retroreflective	Diffuse reflective			
		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-AD23, 43, 73, 93	E3S-AD13, 18, 33, 38, 63, 68, 83, 88	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
Power supply voltage		10 to 30 V DC, ripple: 10 % max.					
Current consumption		40 mA max. (emitter and receiver) 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.
Rated sensing distance	White mat paper	0 to 7 m	0.1 to 2 m	0.1 to 10 cm		0.1 to 20 cm	0 to 70 cm
	Black mat paper	0 to 7 m	0.1 to 2 m	0.3 to 2.5 cm		0.5 to 20 cm	0.15 to 33 cm
Standard sensing object (white mat paper)		7 mm min.	30 mm min.	10 x 10 cm			20 x 20 cm
Variation in sensing distance		---		30 %/-0 % max.			
Hysteresis		---		20 % max.		10 % max.	20 % max.
Sensing distance with attachment		E39-E6: 2.4 m 2-mm slit: 2.5 m 1-mm slit: 1.1 m 0.5-mm slit: 0.5 m	E39-R3: 10 to 130 cm E39-R4: 7 to 60 cm E39-RSA: 10 to 60 cm E39-RSB: 10 to 30 cm	---			
Min. sensing object		without slit: 2.0 mm 2-mm slit: 0.8 mm 1-mm slit: 0.4 mm 0.5-mm slit: 0.2 mm	E39-R1 Reflector: 10 mm E39-R3: 3 mm E39-R4: 1.0 mm	---			
Difference in direction between optical axis and mounting direction		±2° max. (checked along extended line in the mounting direction)		±2° max.			
Response time		0.5 ms max. for both operation and release					
Control output		30 VDC, 100 mA max. (residual voltage: 1 V max.) Open collector (residual voltage: 0.4 V max. at 16 mA)					
Self-diagnostic output		Only Sensors with self-diagnostic function: 50 mA max, 30 VDC (residual voltage: 1 V max.), open collector (residual voltage: 0.4 V max. 16 mA)					
External diagnostic input	Input Voltage	With emitter OFF: NPN: 0 V short-circuit or 1.5 V max. (push current: 1 mA max.) PNP: DC short-circuit or -1.5 V DC max. (pull current: 3 mA max.) With emitter ON: NPN/PNP Open (max. input voltage: 30 V max. with 0.1 mA current leakage)		---			
	Re-sponse time	0.5 ms max.					
Ambient illumination		Incandescent lamp: Sunlight:	Illumination on optical spot: 5,000 lx max. Illumination on optical spot: 10,000 lx max.				
Ambient temperature		Operating: -25°C to 55°C (with no icing) Storage: -40°C to 70°C (with no icing)					
Ambient humidity		Operating: 35% to 85% Storage: 35% to 95%					
Insulation resistance		20 MW min. (at 500 V DC)					
Dielectric strength		1,000 V AC, 50/60 Hz for 1 min					
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude (30G) 2 hrs each in three directions					
Shock resistance		Destruction: Approx. 50G 3 times each in three directions					
Enclosure ratings		IEC: IP67; NEMA: 4X					