E3S-A

CSM_E3S-A_DS_E_10_2

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	Horizontal	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
				Timer Turbo Self Diagnosis External Diagnosis	**E3S-AT21 2M** Emitter E3S-AT21-L Receiver E3S-AT21-D	**E3S-AT41 2M** Emitter E3S-AT41-L Receiver E3S-AT41-D
		Connector (M12)		---	**E3S-AT16** Emitter E3S-AT16-L Receiver E3S-AT16-D	**E3S-AT36** Emitter E3S-AT36-L Receiver E3S-AT36-D
	Vertical	Pre-wired		---	**E3S-AT61 2M** Emitter E3S-AT61-L Receiver E3S-AT61-D	**E3S-AT81 2M** Emitter E3S-AT81-L Receiver E3S-AT81-D
				Timer Turbo Self Diagnosis External Diagnosis	**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	Horizontal	Pre-wired	2 m (100 mm) *2	---	**E3S-AR11 2M**	**E3S-AR31 2M**
				Timer Turbo Self Diagnosis External Diagnosis	**E3S-AR21 2M**	**E3S-AR41 2M**
		Connector (M12)		---	**E3S-AR16**	**E3S-AR36**
	Vertical	Pre-wired		---	**E3S-AR61 2M**	**E3S-AR81 2M**
				Timer Turbo Self Diagnosis External Diagnosis	**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
				Timer, Self Diagnosis	E3S-AD23 2M	E3S-AD43 2M
			200 mm	---	E3S-AD11 2M	E3S-AD31 2M
				Timer, Turbo, Self Diagnosis	E3S-AD21 2M	E3S-AD41 2M
			700 mm	---	E3S-AD12 2M	E3S-AD32 2M
				Timer, Turbo, Self Diagnosis	E3S-AD22 2M	E3S-AD42 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	E3S-AD83 2M
				Timer, Self Diagnosis	E3S-AD73 2M	E3S-AD93 2M
			200 mm	---	E3S-AD61 2M	E3S-AD81 2M
				Timer, Turbo, Self Diagnosis	E3S-AD71 2M	E3S-AD91 2M
			700 mm	---	E3S-AD62 2M	E3S-AD82 2M
				Timer, Self Diagnosis	E3S-AD72 2M	E3S-AD92 2M
		Connector (M12)	100 mm (wide view)	---	E3S-AD68	E3S-AD88
			200 mm		E3S-AD66	E3S-AD86
			700 mm		E3S-AD67	E3S-AD87

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.			
2 mm × 13.6 mm	2.5 m	0.8-mm dia.		1 of each for Emitter/ Receiver (2 Slits total)	

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

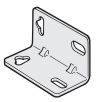
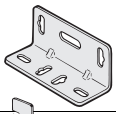
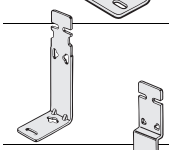
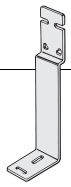
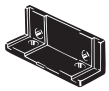
Reflectors/Other Accessories

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

Some Mounting Brackets are provided with the Sensor. Order other Mounting Brackets separately if required.

Appearance	Model	Quantity	Remarks
	**E39-L69**	1	Provided with E3S-A Horizontal Sensors. Two Brackets are provided with a Through-beam Sensor.
	**E39-L70**	1	Provided with E3S-A Vertical Sensors. Two Brackets are provided with a Through-beam Sensor.
	**E39-L59**	1	Provided with E3S-A Vertical Pre-wired Sensors.
	**E39-L81**	1	Provided with E3S-A Vertical ConnectSor Sensors.
	E39-L97 *1	1	Protective Cover for Horizontal Sensors
	E39-L98 *2	1	Protective Cover for Vertical Sensors
	**E39-L60**	1	Close Mounting Plate: Provided with E3S-A Connector Sensors. Two Plates are provided with a Through-beam Sensor.

Note: If a Through-beam Model is used, order two Mounting Brackets, one for the Emitter and one for the Receiver.
*1. Mount a Sensor with a Connector carefully because the Sensor I/O Connector will come into contact with the Mounting Bracket or Mounting Plate.
*2. Usage is not possible with Sensors with Connectors.

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

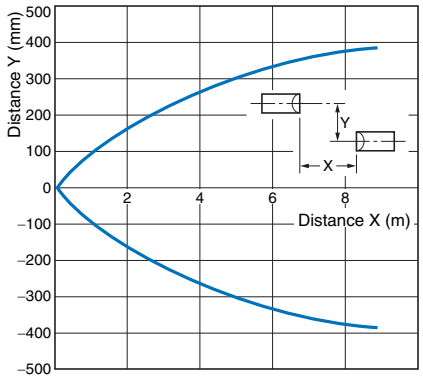
Item \ Model		E3S-AT11, 16, 21, 31, 36, 41, 61, 66, 71, 81, 86, 91	E3S-AR11, 16, 21, 31, 36, 41, 61, 66, 71, 81, 86, 91	E3S-AD13, 18, 23, 33, 38, 43, 63, 68, 73, 83, 88, 93	E3S-AD11, 16, 21, 31, 36, 41, 61, 66, 71, 81, 86, 91	E3S-AD12, 17, 22, 32, 37, 42, 62, 67, 72, 82, 87, 92
Sensing method		**Through-beam Sensors**	**Retro-reflective Sensors (with MSR function)**	**Diffuse-reflective Sensors**		
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

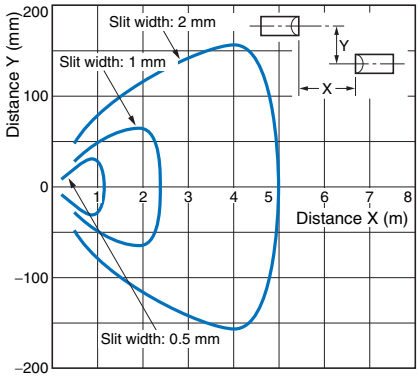
Engineering Data (Reference Value)

Parallel Sensing Range

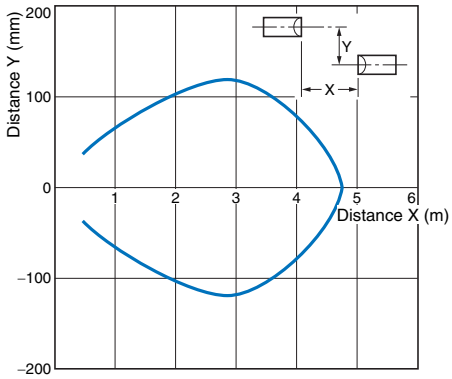
Through-beam Sensors
E3S-AT□□



Through-beam Sensors
E3S-AT□□ + E39-S46 (Slit Sold Separately)

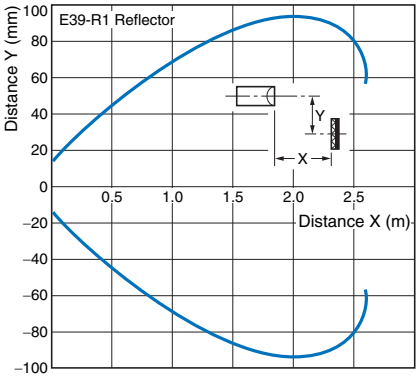


Through-beam Sensors
E3S-AT□□ + E39-E6 (Filter Sold Separately)



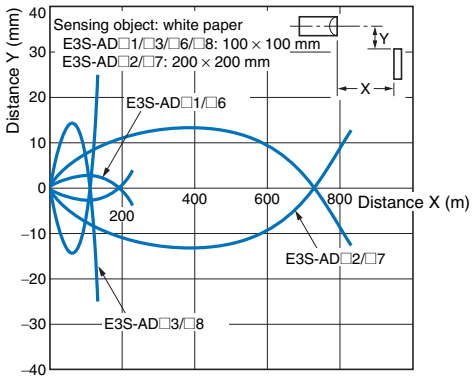
Parallel Sensing Range

Retro-reflective Sensors
E3S-AR□□ + E39-R1 (with Reflector)



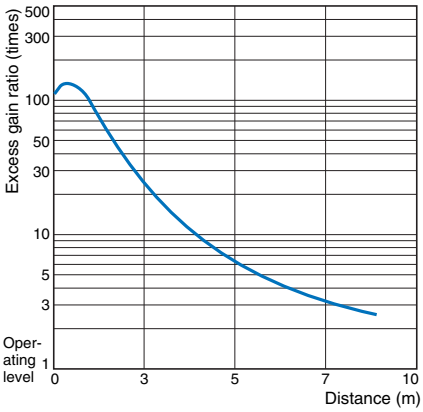
Sensing Range

Diffuse-reflective Sensors
E3S-AD□1/AD□2/AD□3/AD□6/AD□7/AD□8

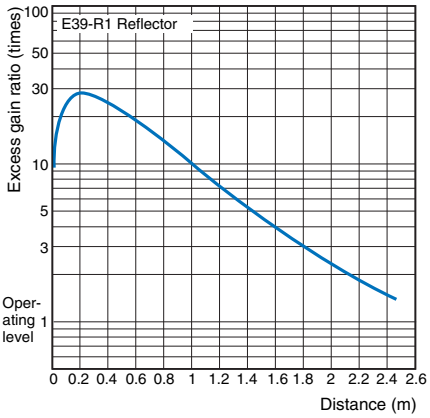


Excess Gain vs. Set Distance

Through-beam Sensors
E3S-AT□□

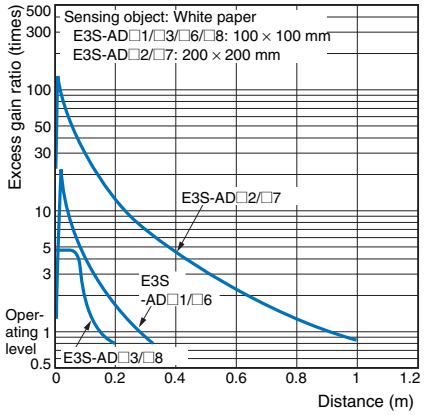


Retro-reflective Sensors
E3S-AR□□ + E39-R1 (with Reflector)



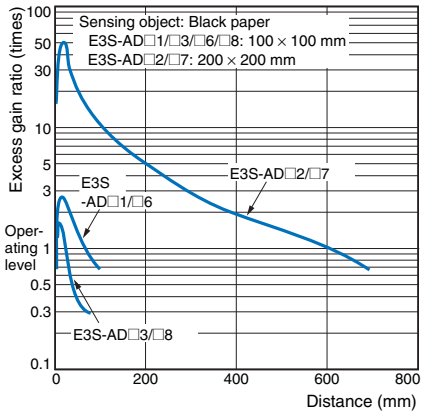
Diffuse-reflective Sensor

E3S-AD□1/AD□2/AD□3/AD□6/AD□7/AD□8 (Detection of White Paper)



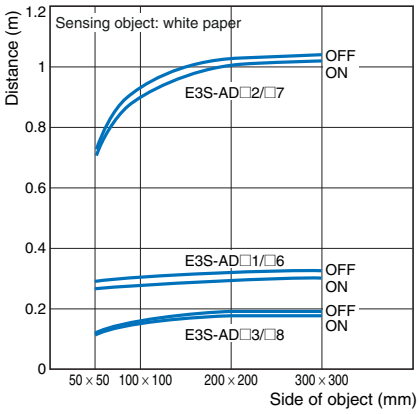
Diffuse-reflective Sensor

E3S-AD□1/AD□2/AD□3/AD□6/AD□7/AD□8 (Detection of Black Paper)



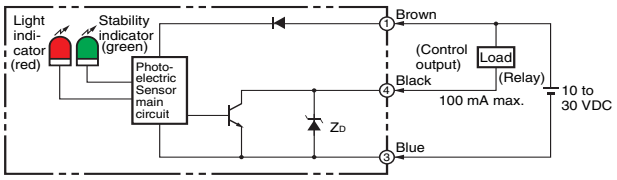
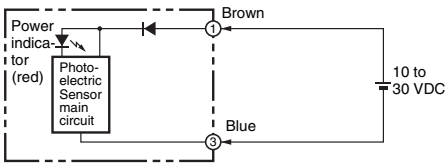
Sensing Object Size vs. Sensing Distance

E3S-AD□1/AD□2/AD□3/AD□6/AD□7/AD□8

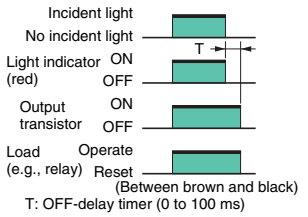
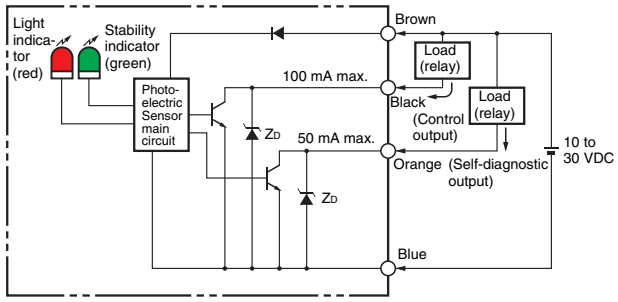
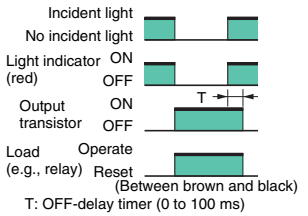
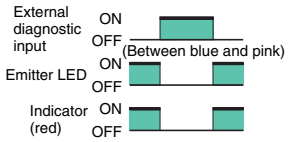
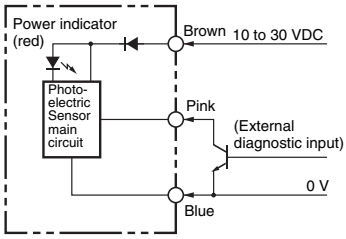
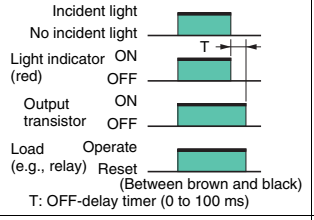
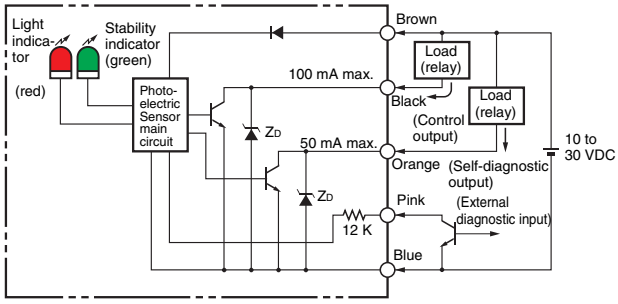
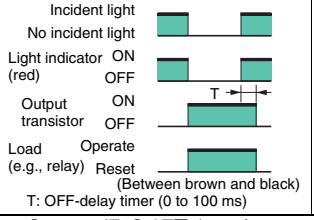


I/O Circuit Diagrams

NPN Output

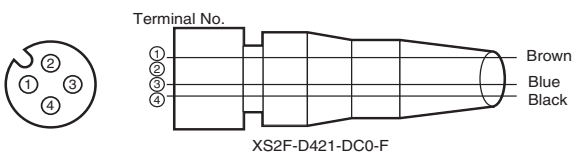
Model	Operation mode	Timing charts	Mode selector switch	Output circuit
E3S-AT11 * E3S-AT16 * E3S-AT61 * E3S-AT66 * E3S-AR11 E3S-AR16 E3S-AR61 E3S-AR66	Light-ON	Incident light No incident light Light indicator (red) ON / OFF Output transistor ON / OFF Load (e.g., relay) Operate / Reset (Between brown and black)	L Side (LIGHT ON)	Through-beam Receivers, Retro-reflective Sensors, Diffuse-reflective Sensors  **Connector Pin Arrangement** Note: Pin 2 is not used.
E3S-AD11 E3S-AD16 E3S-AD61 E3S-AD66 E3S-AD12 E3S-AD17 E3S-AD62 E3S-AD67 E3S-AD13 E3S-AD18 E3S-AD63 E3S-AD68	Dark-ON	Incident light No incident light Light indicator (red) ON / OFF Output transistor ON / OFF Load (e.g., relay) Operate / Reset (Between brown and black)	D Side (DARK ON)	
	Through-beam Emitters			**Connector Pin Arrangement** Note: Pins 2 and 4 are not used.

* Models numbers for Through-beam Sensors (E3S-AT□□) 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-AT11-L 2M), the model number of the Receiver, by adding "-D" (example: E3S-AT11-D 2M). Refer to *Ordering Information* to confirm model numbers for Emitter and Receivers.

Model	Operation mode	Timing charts	Mode selector switch	Output circuit
E3S-AT21 * E3S-AT71 * E3S-AD21 E3S-AD71 E3S-AD22 E3S-AD72 E3S-AD23 E3S-AD73	Light-ON		L Side (LIGHT ON)	Through-beam Receivers, Diffuse-reflective Sensors 
	Dark-ON		D Side (DARK ON)	
	---		---	Through-beam Emitters 
E3S-AR21 E3S-AR71	Light-ON		L Side (LIGHT ON)	Retro-reflective Sensors 
	Dark-ON		D Side (DARK ON)	

*Models numbers for Through-beam Sensors (E3S-AT□1) 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-AT21-L 2M), the model number of the Receiver, by adding "-D" (example: E3S-AT21-D 2M). Refer to *Ordering Information* to confirm model numbers for Emitter and Receivers.

Structure of Sensor I/O Connector



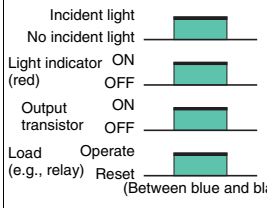
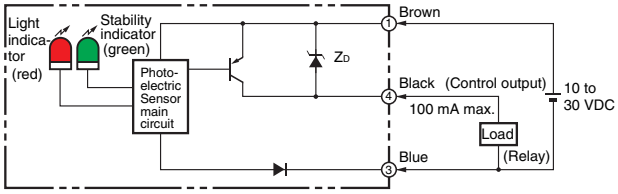
XS2F-D421-DC0-F

Classification	Wire color	Connection Pin No.	Application
For DC	Brown	1	+V
	---	2	---
	Blue	3	0 V
	Black	4	Output

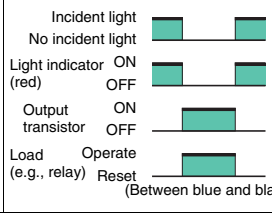
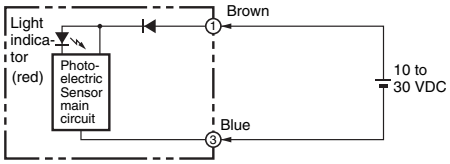
Note: Pin No. 2 is not used.

PNP Output

<table>
<tr><th>Model</th><th>Operation mode</th><th>Timing charts</th><th>Mode selector switch</th><th>Output circuit</th></tr>
<tr><td>E3S-AT31 *
E3S-AT36 *
E3S-AT81 *
E3S-AT86 *

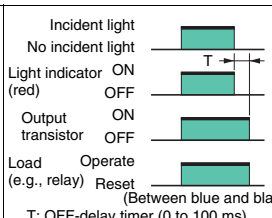
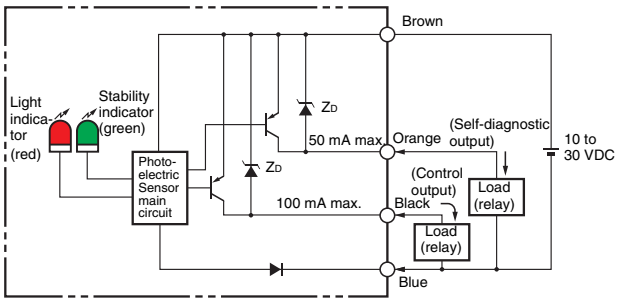
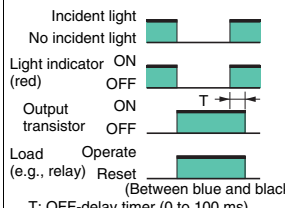
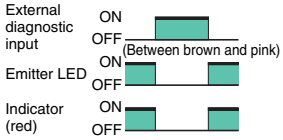
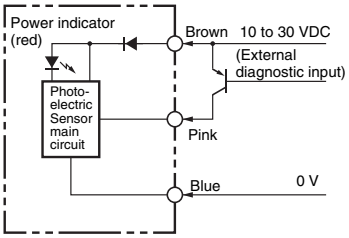
E3S-AR31
E3S-AR36
E3S-AR81
E3S-AR86</td><td>Light-ON</td><td> 
</td><td>L Side
(LIGHT ON)</td><td rowspan="2">Through-beam Receivers, Retro-reflective Sensors, Diffuse-reflective Sensors
 

Connector Pin Arrangement

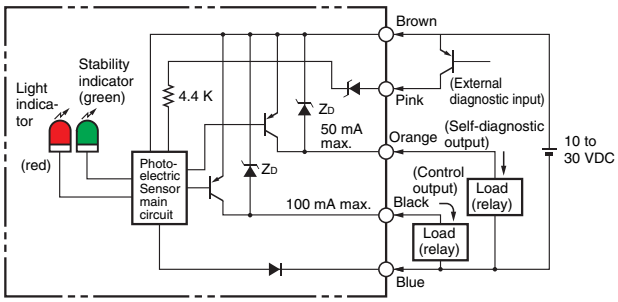
Note: Pin 2 is not used.</td></tr>
<tr><td>E3S-AD31
E3S-AD36
E3S-AD81
E3S-AD86
E3S-AD32
E3S-AD37
E3S-AD82
E3S-AD87
E3S-AD33
E3S-AD38
E3S-AD83
E3S-AD88</td><td>Dark-ON</td><td> 
</td><td>D Side
(DARK ON)</td></tr>
<tr><td colspan="2">Through-beam Model Emitters</td><td colspan="2"> 

Connector Pin Arrangement

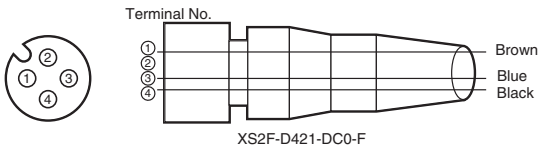
Note: Pins 2 and 4 are not used.</td></tr>
<tr><td>E3S-AT41 *
E3S-AT91 *

E3S-AD41
E3S-AD91
E3S-AD42
E3S-AD92
E3S-AD43
E3S-AD93</td><td>Light ON</td><td> 
</td><td>L Side
(LIGHT ON)</td><td rowspan="2">Through-beam Receivers, Diffuse-reflective Sensors
 
</td></tr>
<tr><td>E3S-AD41
E3S-AD91
E3S-AD42
E3S-AD92
E3S-AD43
E3S-AD93</td><td>Dark ON</td><td> 
</td><td>D Side
(DARK ON)</td></tr>
<tr><td></td><td>---</td><td> 
</td><td>---</td><td>Through-beam Emitters
 
</td></tr>
</table>

*Models numbers for Through-beam Sensors (E3S-AT□□) 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-AT31-L 2M), the model number of the Receiver, by adding "-D" (example: E3S-AT31-D 2M). Refer to *Ordering Information* to confirm model numbers for Emitter and Receivers.

Model	Operation mode	Timing charts	Mode selector switch	Output circuit
E3S-AR41 E3S-AR91	Light-ON	Incident light No incident light Light indicator (red) ON OFF Output transistor ON OFF Load (e.g., relay) Operate Reset T (Between blue and black) T: OFF-delay timer (0 to 100 ms)	L Side (LIGHT ON)	Retro-reflective Sensors 
	Dark-ON	Incident light No incident light Light indicator (red) ON OFF Output transistor ON OFF Load (e.g., relay) Operate Reset T (Between brown and black) T: OFF-delay timer (0 to 100 ms)	D Side (DARK ON)	

Structure of Sensor I/O Connector

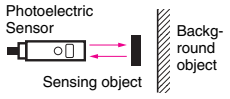
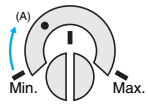
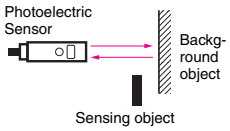
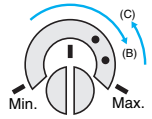
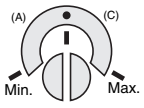


Classification	Wire color	Connection Pin No.	Application
For DC	Brown	1	+V
	---	2	---
	Blue	3	0 V
	Black	4	Output

Note: Pin 2 is not used.

Adjustment Methods

Sensitivity Adjustment for Diffuse-reflective Sensors Set to Light ON

Item	Sensing condition	Sensitivity adjuster	Indicators	Procedure
1) Position A			ON → **OFF** Stability indicator (green) OFF → **ON** Light indicator (red)	Locate a sensing object at the sensing distance, set the sensitivity adjuster to the minimum scale position, and gradually increase sensitivity by turning the sensitivity adjuster clockwise until the incident light indicator (red LED) is ON. Position A is where the indicator has turned ON.
2) Position B			ON → **OFF** Stability indicator (green) ON → **OFF** Light indicator (red)	Position B is when the sensing object is removed and the sensitivity adjuster is turned clockwise until the incident light indicator (red LED) is ON. Position C is where the adjuster is turned counterclockwise (reducing the sensitivity) from position B until the incident light indicator (red LED) is OFF. When there are no background objects, the maximum sensitivity is position C.
3) Setting	---		**ON** Stability indicator (green) ON → **OFF** Light indicator (red)	Set the sensitivity adjuster to halfway between (A) and (C) (at the optimum sensitivity). Check that the stability indicator (green LED) turns ON according to whether the sensing object is there or not. There is not sufficient margin if it does not turn ON. If this is the case, reconsider the detection method.

Unlike conventional Photoelectric Sensors, the variation in the sensitivity of E3S-A Photoelectric Sensors is minimal. This means the sensitivity can be adjusted on only a single Photoelectric Sensor, and then the adjusters on the other Photoelectric Sensors can be set to the same scale position. There is no need to adjust the sensitivity of each Photoelectric Sensor individually.

Safety Precautions

⚠ WARNING

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

Precautions for Safe Use

1. Do not use the product in environments subject to flammable or explosive gases.
2. Do not use the Sensor in environments where the cables may become immersed in oil or other liquids or where liquids may penetrate the Sensor.
   Doing so may result in damage from burning and fire, particularly if the liquid is flammable.
3. When disposing of the product, treat it as industrial waste.

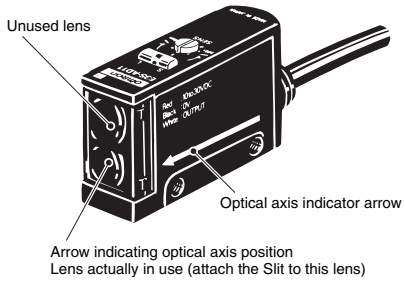
Precautions for Correct Use

Do not use the product in atmospheres or environments that exceed product ratings.
Do not use the Sensor in water, rainfall, or outdoors.

Mounting

Position of Optical Axis of Through-beam Model

Unlike conventional through-beam sensors, the E3S-A Through-beam Photoelectric Sensor incorporates 2 lenses. The lens actually in use is the one marked with an arrow indicating the position of the optical axis. When using a Slit, attach it to the lens marked with the arrow.

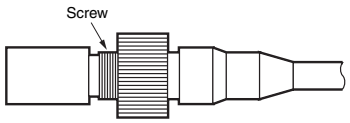


Position of Arrow Indicating Optical Axis

Model	Position of lens in use
E3S-A (Vertical Sensors)	Top
E3S-A (Horizontal Sensors)	Bottom

Tightening the Connector

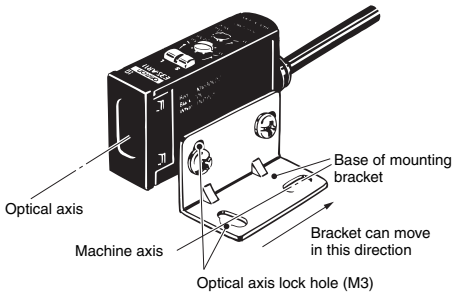
Manually tighten the connector until the threads have completely disappeared. If tightening is insufficient, the degree of protection may not be maintained, or the connector may become loose when it is subjected to vibration. Using pliers to tighten the connector may damage it.



Use the E39-L60 Close Mounting Plate (provided) if the Sensor is mounted using mounting brackets or if it is mounted directly. (Refer to *Dimensions*.)

Mounting Bracket (Provided)

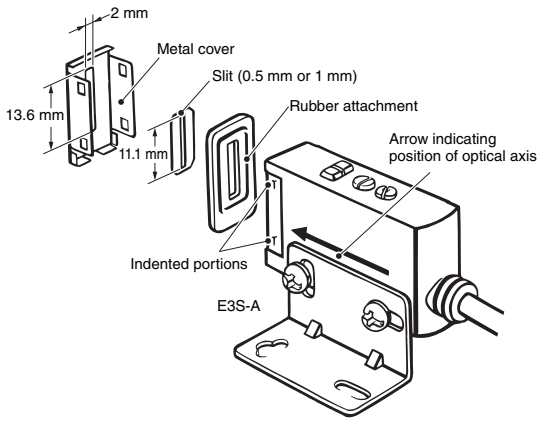
The direction of the optical axis coincides with the machine axis of the E3S-A when the mounting screw is inserted into the lock hole of the Mounting Bracket. If the mounting surface and the screw hole are correctly aligned toward the sensing object (or toward the Retroreflector for a Through-beam Sensor), the mechanical axis and optical axis will be aligned when the screw is inserted into the hole. Incident light will be detected, and time-consuming adjustment will not be necessary. (If, however, the mounting surface is not flat, adjustment of the optical axis may still be required.)
Adjust the position of the Sensor so that incident light points at the center. Make sure that the incident light is at a fixed position.
The maximum tightening torque of the screw is 0.53 N.m max.



● Adjustments

E39-S46 Through-beam Slits

(Accessory, order separately)
Use the rubber attachment with the metal cover if a slit width of 2 mm is required. (A Slit is not required in this case.) Insert the 0.5- or 1-mm Slit between the metal cover and rubber attachment if a slit width of 0.5 or 1 mm is desired.
These Slits fit into the rubber attachment.

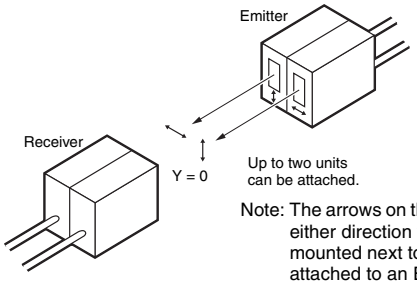


Apply the Slit to the lens of the Photoelectric Sensor marked with an arrow indicating the position of the optical axis (apply it to the bottom lens of Horizontal Sensors and the top lens of Vertical Sensors).

E39-E6 Polarized Mutual Interference Prevention Filters for Through-beam Sensors

(Accessory, order separately)

- A set of 4 Filters are sold together for two Through-beam Sensors (for 2 each for Emitters and Receivers). Order one for every two sets of Photoelectric Sensors.
- For mounting, refer to the figure of the Through-beam Slits.



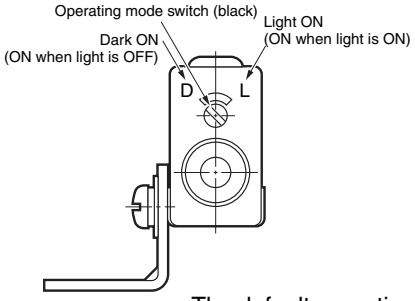
Note: The arrows on the Filters can be attached in either direction when two Sensors are mounted next to each other. The Filter attached to an Emitter and to the corresponding Receiver must be the same in direction of polarization or the Sensor will not function.

- The arrow printed on the cover indicates the direction of polarization. By attaching the Filters opposite to each other in polarization to the Emitters and the Receivers in rows, mutual interference can be prevented (in any case, the Filter attached to an Emitter and to the corresponding Receiver must be the same in direction of polarization or the Photoelectric Sensor will not function).

Operating Mode Selection

As shown in the following illustration, the E3S-A has an operating mode selector on the panel where the Receiver connector is located.

With this operating mode selector, the E3S-A is in either Dark-ON or Light-ON mode.



The default operating mode is shown in the following table.

Sensing method	Default switch setting
Through-beam Sensors Retro-reflective Sensors	Dark-ON
Diffuse-reflective Sensors	Light-ON

Timer and Turbo Switch

The Emitter of the Through-beam Sensor with the self-diagnostic feature incorporates a turbo switch. When this switch is ON, the intensity of the red LED light source can be increased to make a brighter spot.

Turbo Function (Turbo Switch)

The turbo function is effective with the turbo switch pressed, and the function is reset automatically when released.

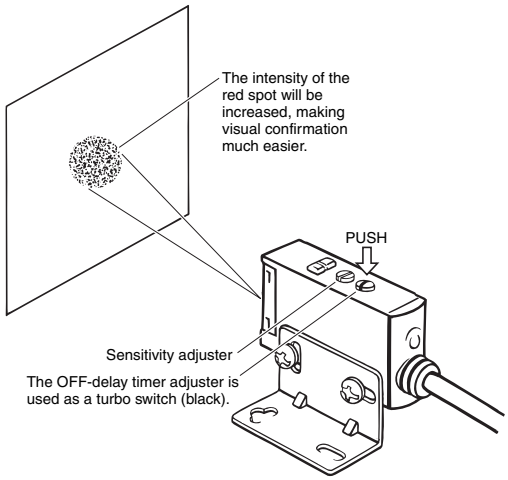
With the turbo function switched ON, the light spot is visible even at a distance of 200 mm, making it easy to check the sensing position and the angle of the optical axis.

Precautions

(1)Do not keep the turbo switch pressed for longer than 3 minutes. (It will not break even if it is pressed for an extended period.)

(2)Pressing the switch may change the timer delay settings. Set the timer after using the turbo function to check the optical axis.

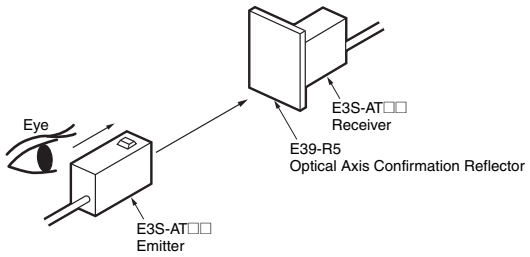
(3)To press the switch, use a force of 9.8 N max.



Using the E39-R5 Optical Axis Reflector for Through-beam Sensors

(Accessory, order Separately)

Use this attachment when the set distance is long and adjustment is mechanically difficult with a sensing object.



- Attach the Reflector to the Receiver.
- Look at the Reflector from right behind the Emitter. The Reflector should be bright with red light when the optical beam strikes the Reflector. If the Emitter has a turbo function, the Reflector looks brighter with the function switched ON.
- When the Reflector is removed, the light beam strikes the Receiver.

(Unit: mm)

Dimensions

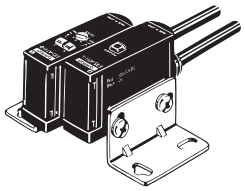
Unless otherwise specified, the tolerance class IT16 is used for dimensions in this data sheet.

E3S-A Built-in Amplifier Photoelectric Sensor

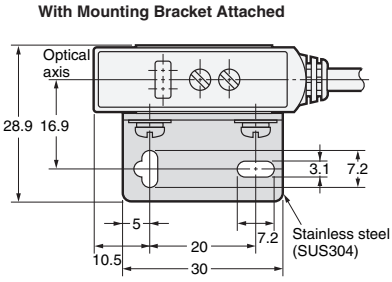
Through-beam Sensors (Horizontal)

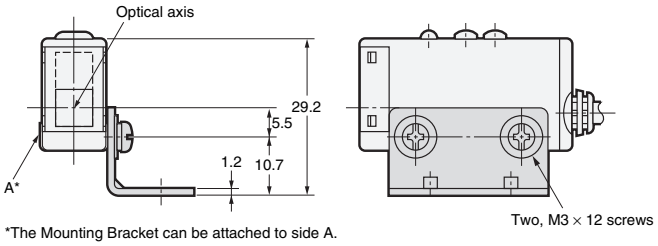
Pre-wired Sensors

E3S-AT11/21/31/41 (Receiver)

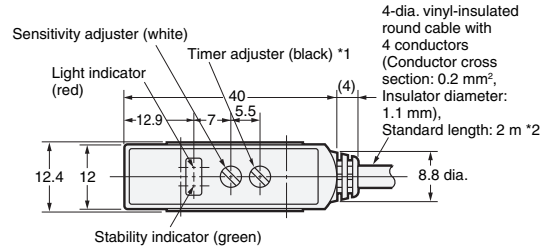


Emitter: E3S-AT□□-L
Receiver: E3S-AT□□-D

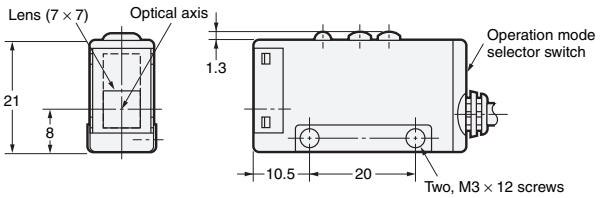


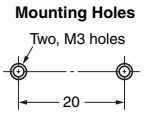


*The Mounting Bracket can be attached to side A.

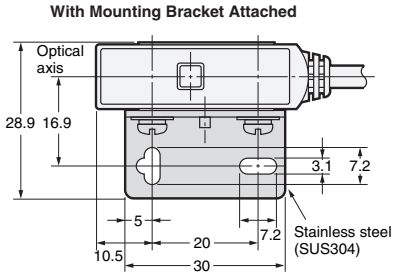


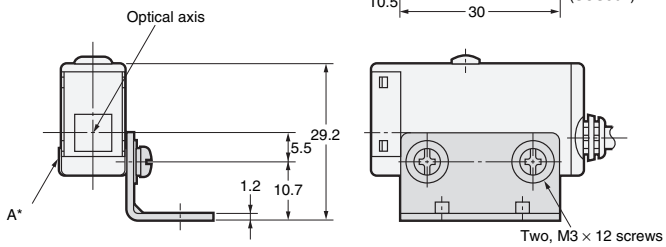
*1. Not applicable to Sensors with timer adjusters (E3S-AT11 and E3S-AT31).
*2. The E3S-AT11 or E3S-AT31 has three conductors.



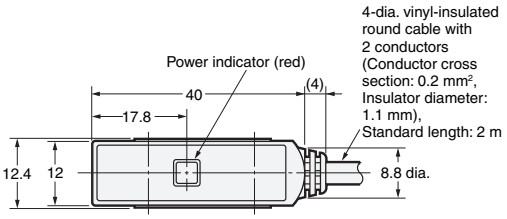


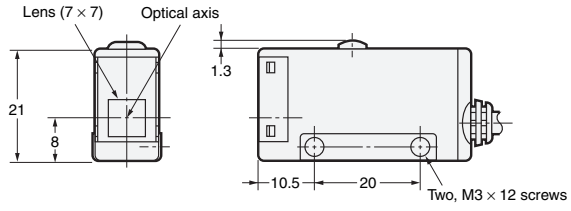
E3S-AT11/31 (Emitter)



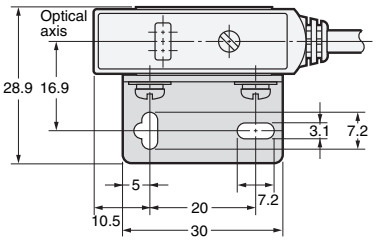


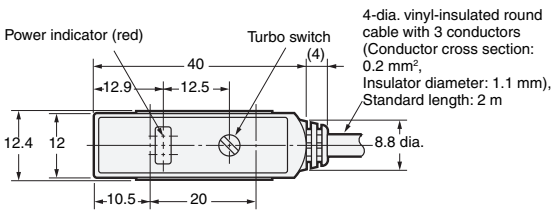
*The Mounting Bracket can be attached to side A.

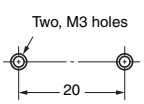




E3S-AT21/41(Emitter)



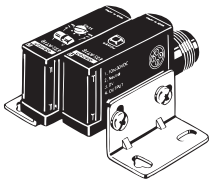


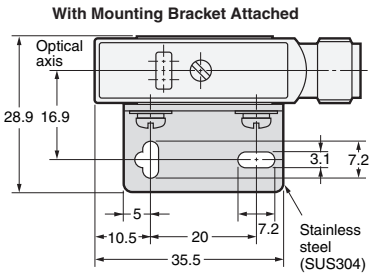


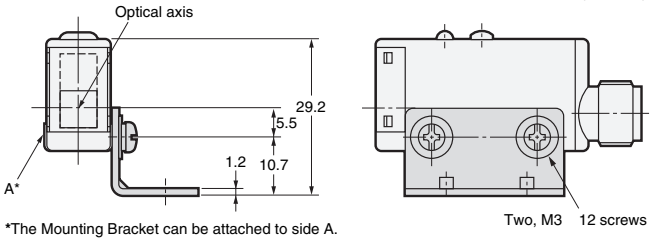
Note: Models numbers for Through-beam Sensors (E3S-AT□1) are for sets that include both the Emitter and Receiver.
The model number of the Emitter is expressed by adding "-L" to the set model number (example: E3S-AT11-L 2M), the model number of the Receiver, by adding "-D" (example: E3S-AT11-D 2M). Refer to *Ordering Information* to confirm model numbers for Emitter and Receivers.

Sensors with Standard Connectors

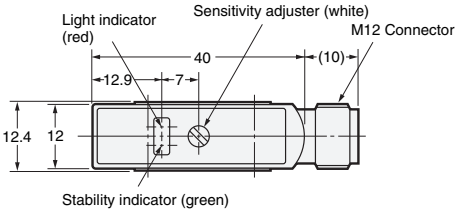
E3S-AT16/36 (Receiver)

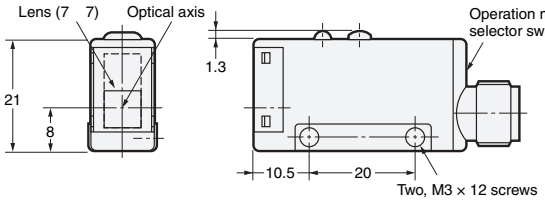




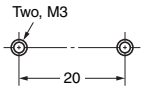


*The Mounting Bracket can be attached to side A.

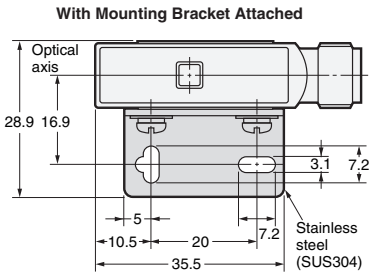


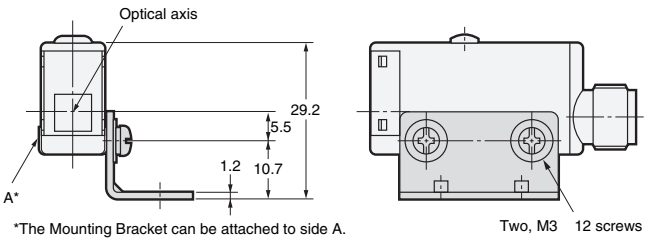


Mounting Holes

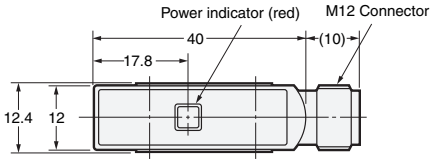


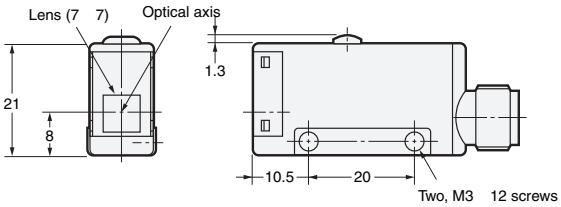
E3S-AT16/36 (Emitter)



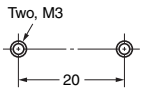


*The Mounting Bracket can be attached to side A.





Mounting Holes

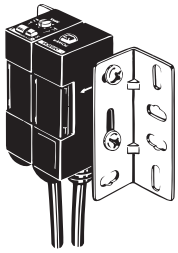


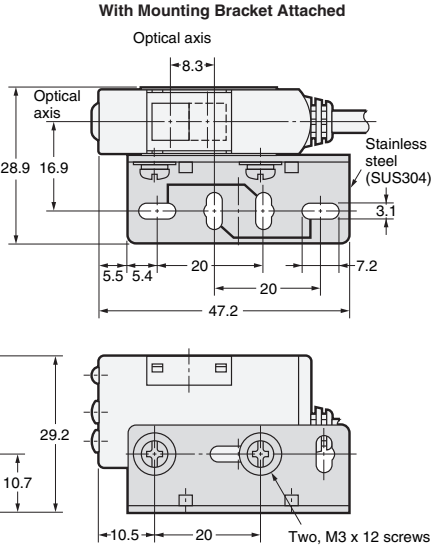
Note: Models numbers for Through-beam Sensors (E3S-AT□6) are for sets that include both the Emitter and Receiver.
The model number of the Emitter is expressed by adding "-L" to the set model number (example: E3S-AT16-L), the model number of the Receiver, by adding "-D" (example: E3S-AT16-D). Refer to *Ordering Information* to confirm model numbers for Emitter and Receivers.

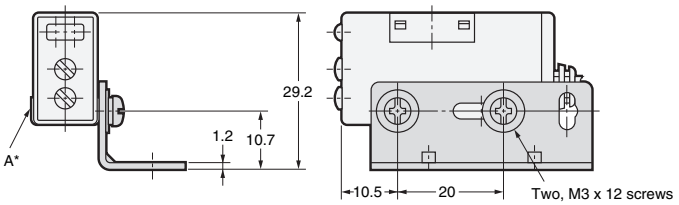
Through-beam Sensors (Vertical)

Pre-wired Sensors

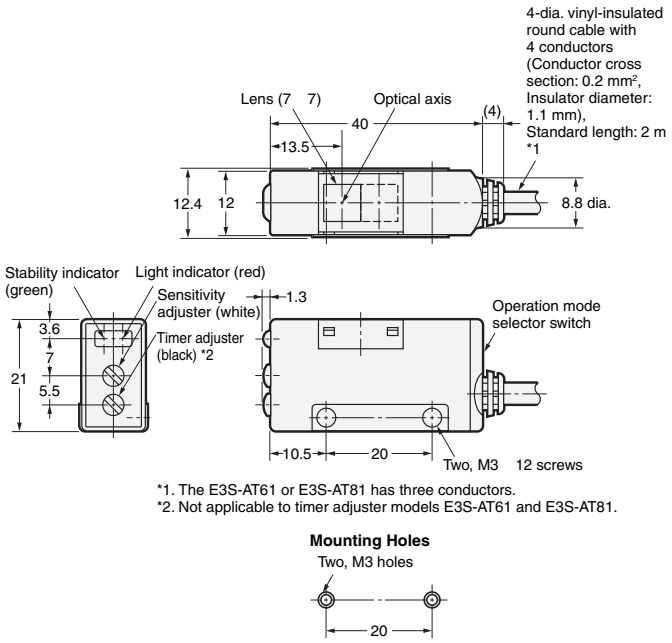
E3S-AT61/71/81/91 (Receiver)





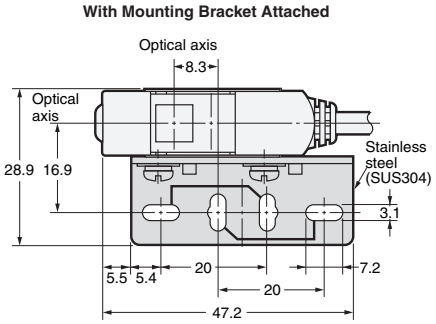


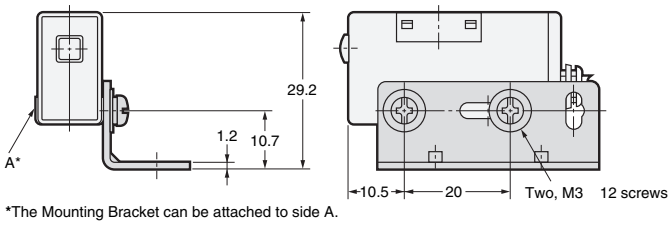
*The Mounting Bracket can be attached to side A.



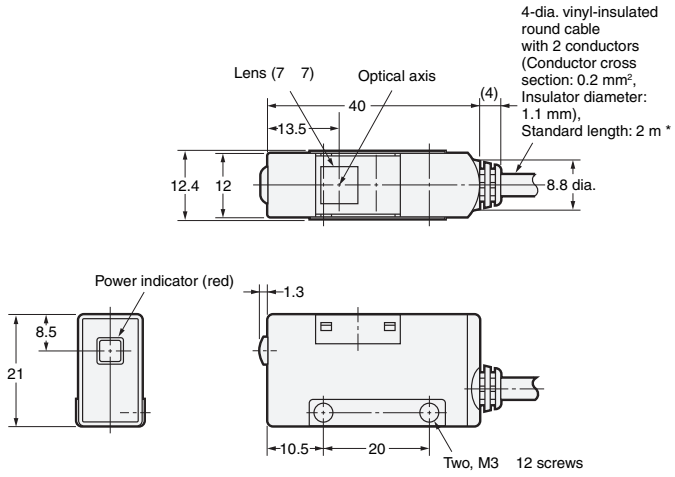
*1. The E3S-AT61 or E3S-AT81 has three conductors.
*2. Not applicable to timer adjuster models E3S-AT61 and E3S-AT81.

E3S-AT61/81 (Emitter)

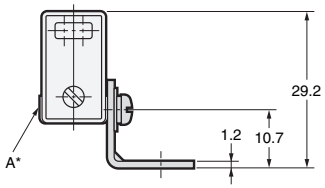




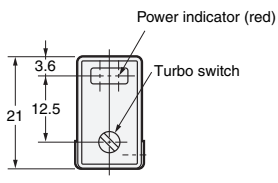
*The Mounting Bracket can be attached to side A.



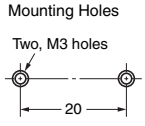
E3S-AT71/91 (Emitter)



*The Mounting Bracket can be attached to side A.



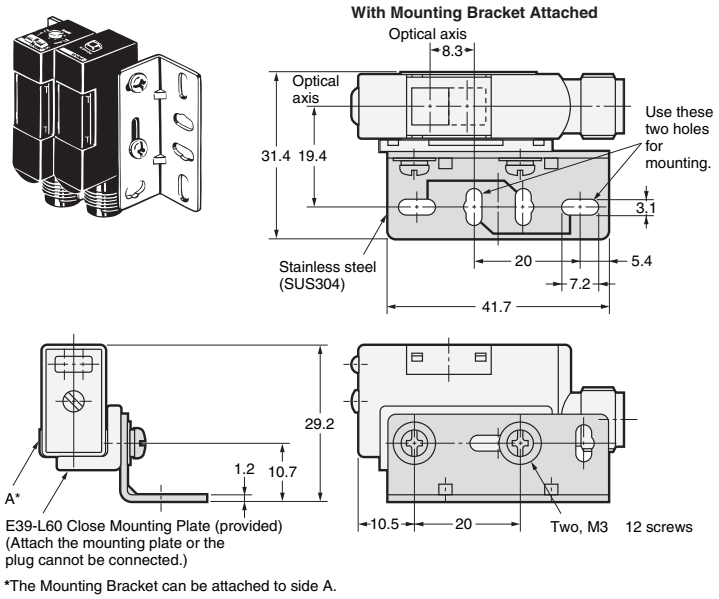
*The E3S-AT71 of E3S-AT91 has three conductors.



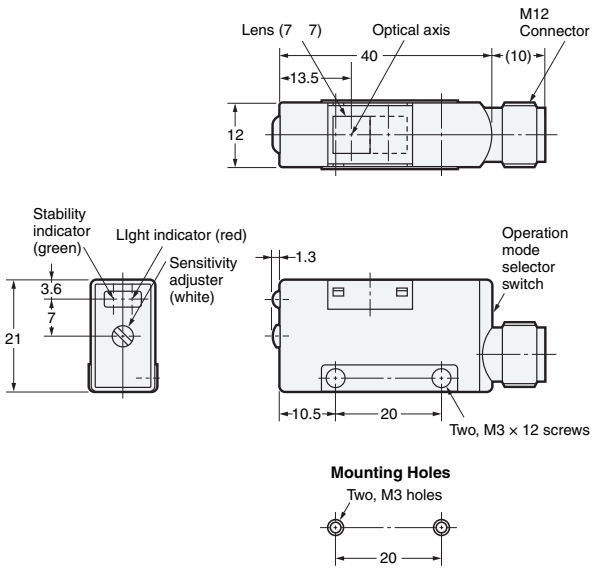
Note: Models numbers for Through-beam Sensors (E3S-AT□1) are for sets that include both the Emitter and Receiver.
The model number of the Emitter is expressed by adding "-L" to the set model number (example: E3S-AT61-L 2M), the model number of the Receiver, by adding "-D" (example: E3S-AT61-D 2M). Refer to *Ordering Information* to confirm model numbers for Emitter and Receivers.

Connector Sensors

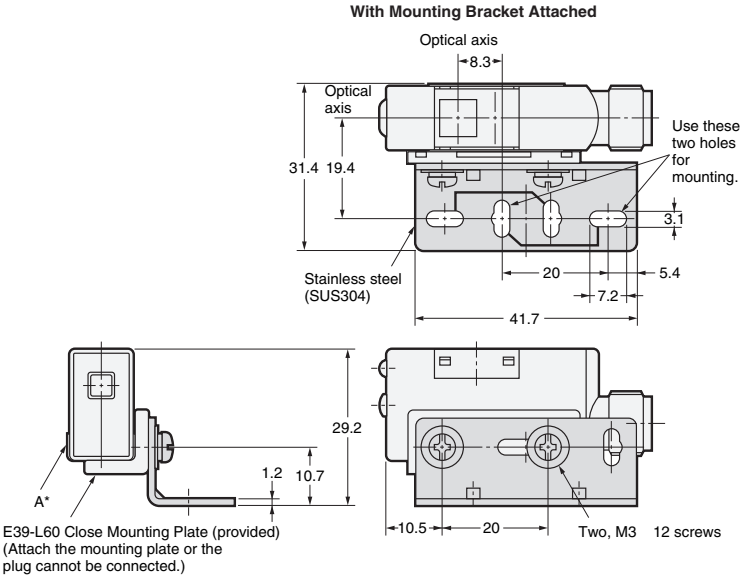
E3S-AT66/86 (Receiver)



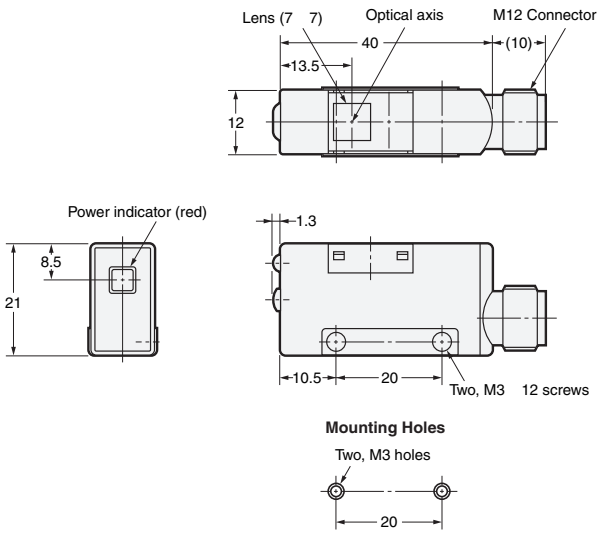
*The Mounting Bracket can be attached to side A.



E3S-AT66/86 (Emitter)



*The Mounting Bracket can be attached to side A.

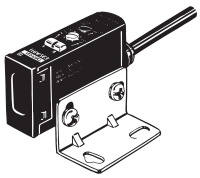


Note: Models numbers for Through-beam Sensors (E3S-AT□6) are for sets that include both the Emitter and Receiver.
The model number of the Emitter is expressed by adding "-L" to the set model number (example: E3S-AT66-L), the model number of the Receiver, by adding "-D" (example: E3S-AT66-D). Refer to *Ordering Information* to confirm model numbers for Emitter and Receivers.

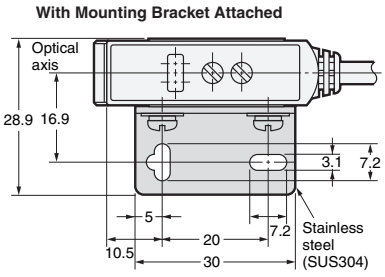
Retro-reflective Sensors (Horizontal)

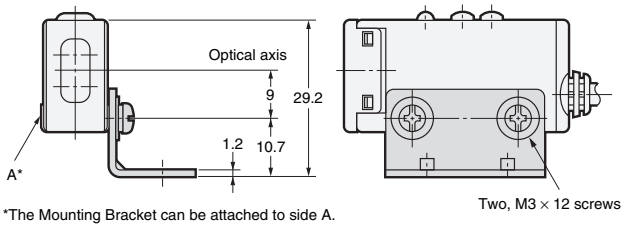
Pre-wired Sensors

E3S-AR11/21/31/41

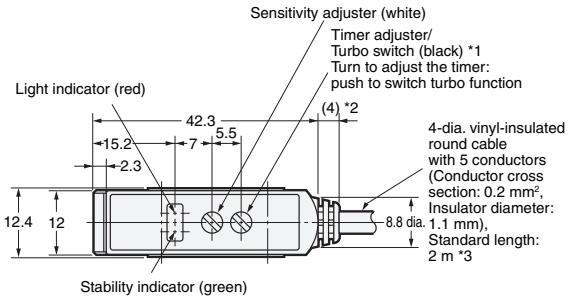


With Mounting Bracket Attached

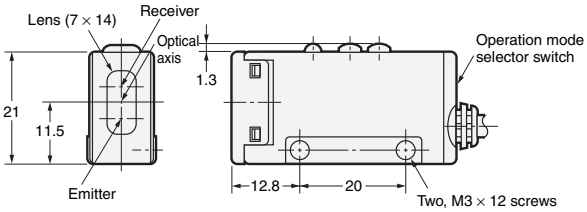




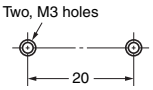
*The Mounting Bracket can be attached to side A.



*1. For E3S-AR21 and E3S-AR41 only.
*2. 9.7 mm for E3S-AR21 and E3S-AR41.
*3. The E3S-AR11 or E3S-AR31 has three conductors.

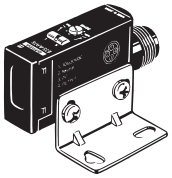


Mounting Holes

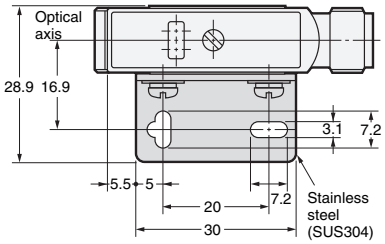


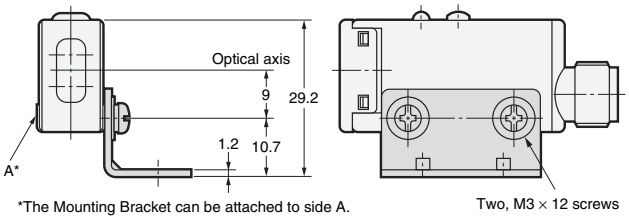
Sensors with Connectors

E3S-AR16/36

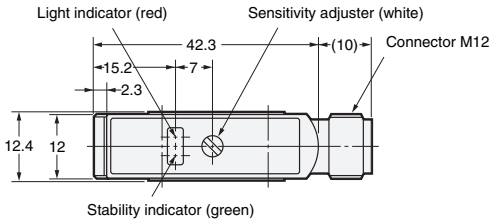


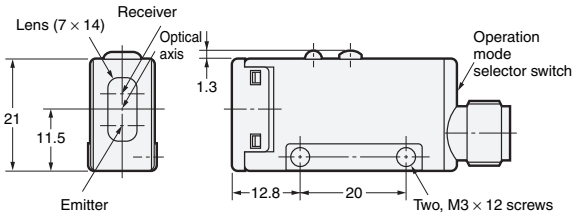
With Mounting Bracket Attached



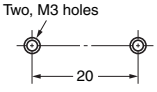


*The Mounting Bracket can be attached to side A.





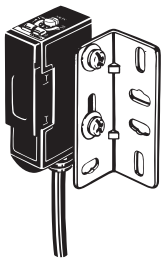
Mounting Holes

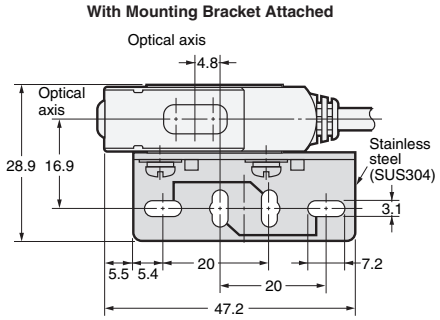


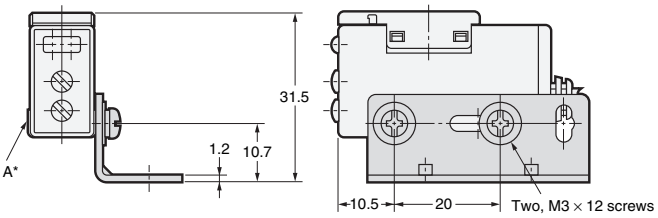
Retro-reflective Sensors (Vertical)

Pre-wired Sensors

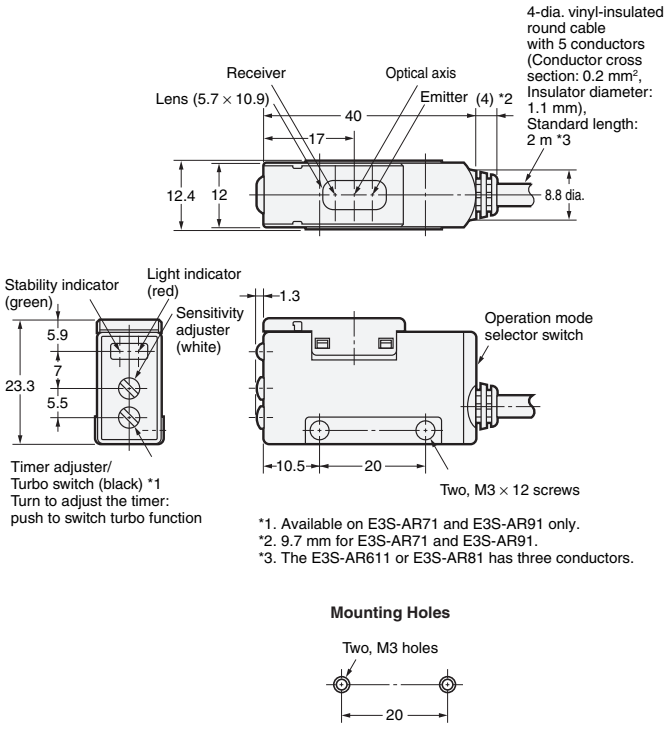
E3S-AR61/71/81/91







*The Mounting Bracket can be attached to side A.

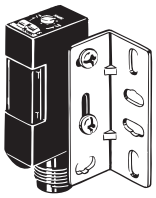


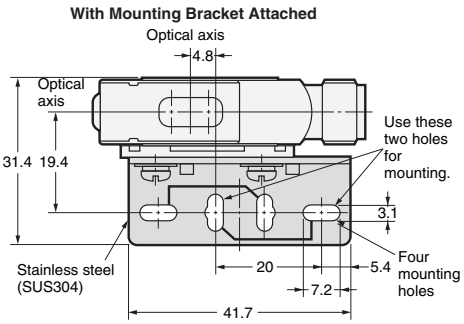
*1. Available on E3S-AR71 and E3S-AR91 only.
*2. 9.7 mm for E3S-AR71 and E3S-AR91.
*3. The E3S-AR611 or E3S-AR81 has three conductors.

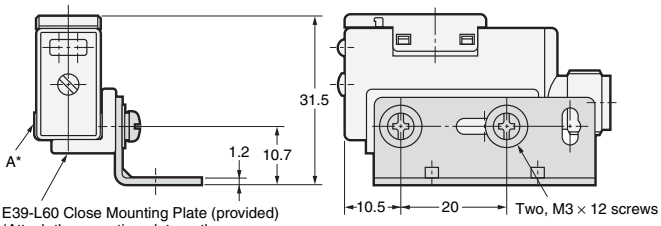
Mounting Holes

Sensors with Connectors

E3S-AR66/86

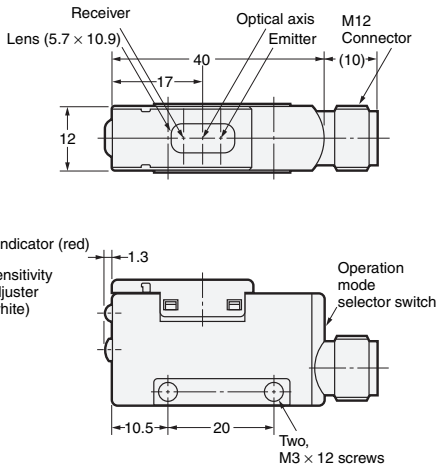




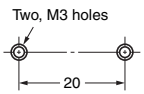


E39-L60 Close Mounting Plate (provided)
(Attach the mounting plate or the plug cannot be connected.)

*The Mounting Bracket can be attached to side A.



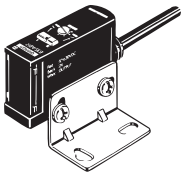
Mounting Holes

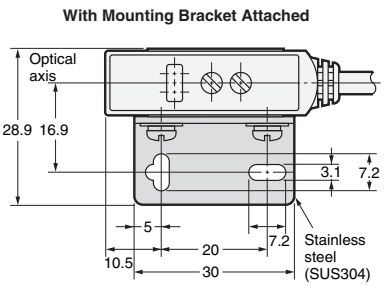


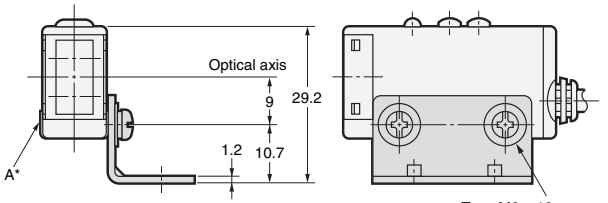
Diffuse-reflective Sensors (Horizontal)

Pre-wired Sensors

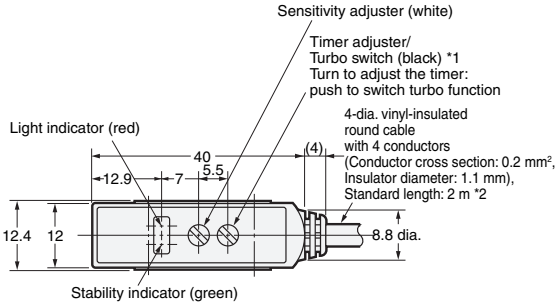
E3S-AD11/12/13/21/22/23
-AD31/32/33/41/42/43



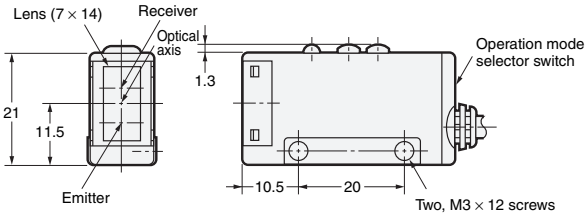




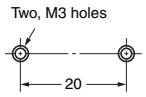
*The Mounting Bracket can be attached to side A.



*1. Timer adjuster: Not available on E3S-AD11, E3S-AD12, E3S-AD13, E3S-AD31, E3S-AD32 and E3S-AD33.
Turbo switch: Available on E3S-AD21 and E3S-AD41 only.
*2. The E3S-AD11, E3S-AD12, E3S-AD13, E3S-AD31, E3S-AD32, or E3S-AD33 has three conductors.

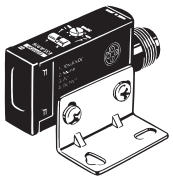


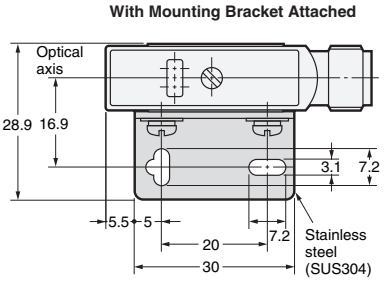
Mounting Holes

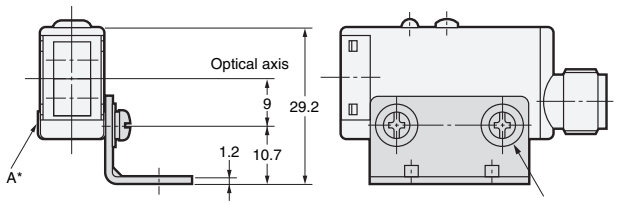


Sensors with Connectors

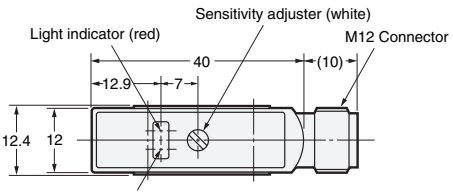
E3S-AD16/17/18/36/37/38

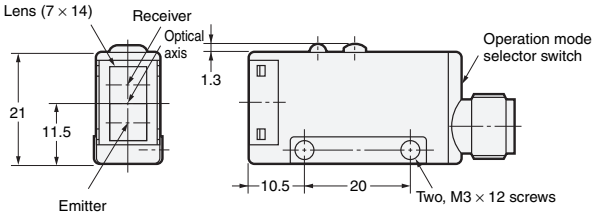




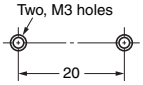


*The Mounting Bracket can be attached to side A.





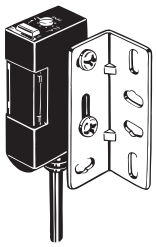
Mounting Holes

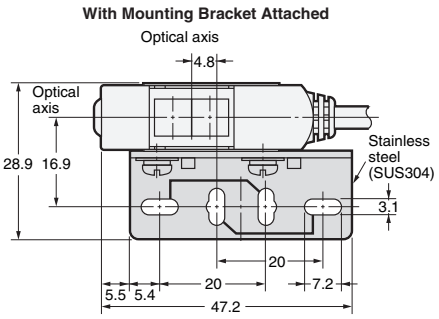


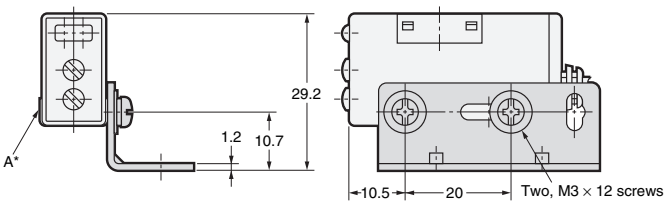
Diffuse-reflective Sensors (Vertical)

Pre-wired Sensors

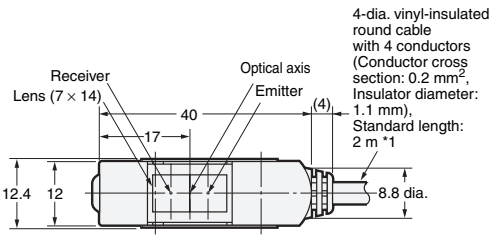
E3S-AD61/62/63/71/72/73
-AD81/82/83/91/92/93

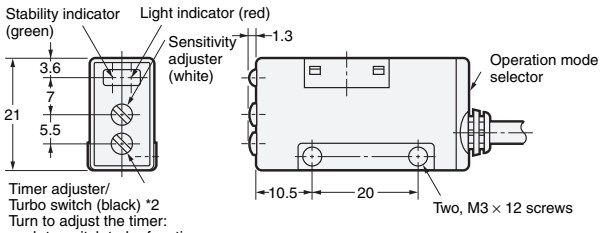






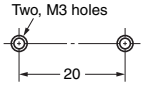
*The Mounting Bracket can be attached to side A.





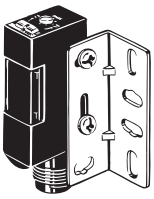
*1. E3S-AD61, E3S-AD62, E3S-AD63, E3S-AD81, E3S-AD82, and E3S-AD83 have three conductors.
*2. Timer adjuster: Not available on E3S-AD61, E3S-AD62, E3S-AD63, E3S-AD81, E3S-AD82 and E3S-AD83.
Turbo switch: Available on E3S-AD71 and E3S-AD91 only.

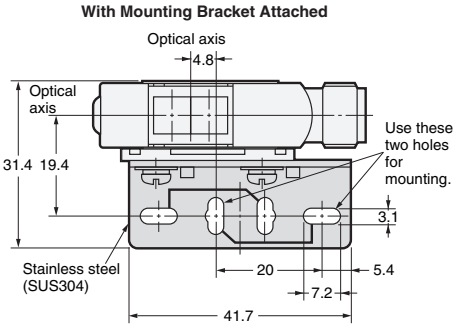
Mounting Holes

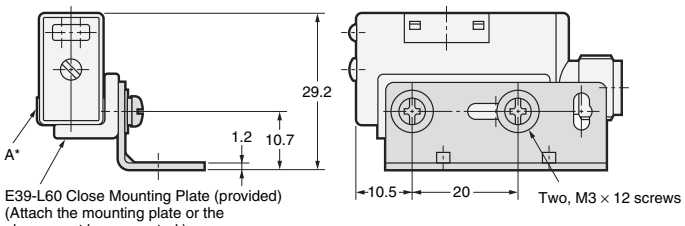


Sensors with Connectors

E3S-AD66/67/68/86/87/88

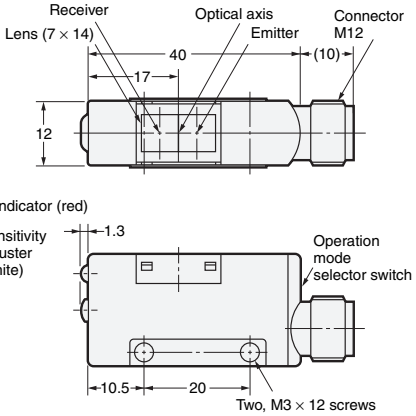




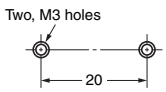


E39-L60 Close Mounting Plate (provided)
(Attach the mounting plate or the plug cannot be connected.)

*The Mounting Bracket can be attached to side A.



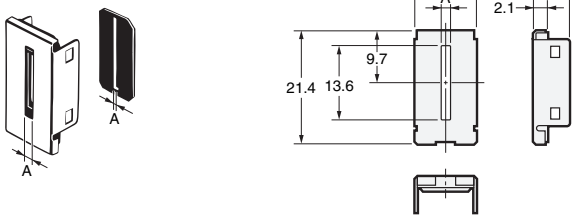
Mounting Holes



Accessories (Order Separately)

Insert-type Long Slit (For Through-beam Model)

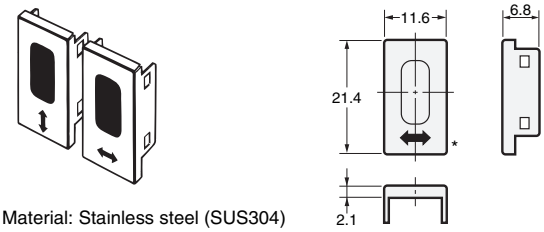
E39-S46



Name	Dimensions A	Material	Quantity
Supporter	2 mm	Stainless steel (SUS304)	One each for Emitter and Receiver (total of 2)
Slits	0.5 mm	PVC	One each for Emitter and Receiver (total of 4)
	1 mm		

Filters for Mutual Interference Prevention (For Through-beam Model)

E39-E6

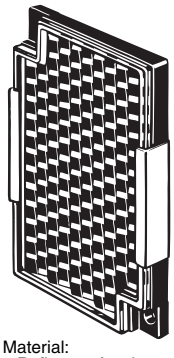


Material: Stainless steel (SUS304)

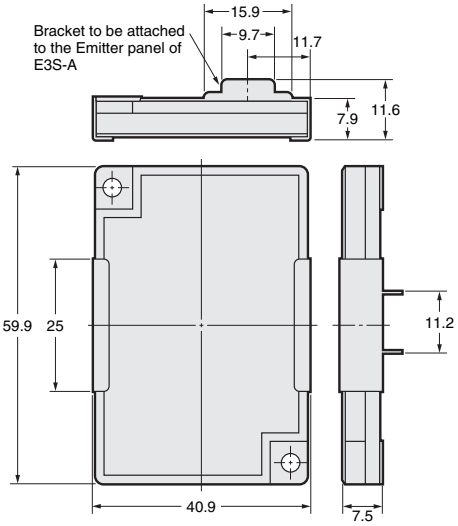
*Two of each for the Emitter and Receiver (total of four)

Optical Axis Confirmation Reflector (For Through-beam Model)

E39-R5



Material:
Reflector: Acryl
Back: ABS



Reflectors
Mounting Brackets

In the interest of product improvement, specifications are subject to change without notice.

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2017.3

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