Photoelectric Sensors

Overview Standard Photoelectric Sensors

Cylindrical Photoelectric Sensors

						
Housing	Cylindrical					
Model	E3F2					
Type	Standard, Axial					
Order reference	E3F2-LS	E3F2-DS1	E3F2-DS3	E3F2-R2	E3F2-R2R	E3F2-7
	Distance setting (BGS, FGS)	Diffuse reflective		Retroreflective		Through-beam
Housing material	Plastic (ABS), Brass, Stainless Steel					
Features	• cylindrical housing for easy mounting and installation • high quality for reliable object detection at excellent value for money • wide portfolio range for all standard applications					
	• thin beam for exact positioning • visible light for simple installation	• wide beam for reliable • detection of structured objects	• adjustable sensitivity for stable detection	• without adjuster for higher protection against tampering	• polarizing (MSR) for reliable detection of shiny objects	• cost efficient through beam solution
Max. Sensing Distance	0.1 m	0.1 m	0.3 m	2 m		7 m
Light source	Red LED	Infrared LED		Infrared LED	Red LED	Infrared LED
Key specifications	• Light ON/Dark ON selectable • 10 - 30 VDC • IP67 • IP69k					
Housing size	M18					
Connection	Cable: PVC Cable connector: M8, M12, customer specific Connector: M12					
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Cylindrical Photoelectric Sensors

					
Housing	Cylindrical				
Model	E3F2				
Type	Standard, Radial		Long distance, Axial		
Order reference	E3F2-DS3□41	E3F2-R2R□41	E3F2-D1	E3F2-R4	E3F2-10
	Diffuse reflective	Retroreflective	Diffuse reflective	Retroreflective	Through-beam
Housing material	Plastic (ABS), Brass				
Features	• radial optics for easy mounting, installation and adjustment		• high power LEDs for increased sensing distance and increased reliability in dirty environments		
	• adjustable sensitivity for stable detection adjustable sensitivity for stable detection	• polarizing (MSR) for reliable detection of shiny objects	• adjustable sensitivity for stable detection	• polarizing (MSR) for reliable detection of shiny objects	• coaxial setup for precision detection • test input for system reliability check
Max. Sensing Distance	0.3 m	2 m (typical 3.1 m with reflector E39-R8)	1 m	4 m (typical 5.6 m with reflector E39-R8)	10 m
Light source	Infrared LED	Red LED	Infrared LED	Red LED	Infrared LED
Key specifications	• Light ON/Dark ON selectable • 10 - 30 VDC • IP67, IP69k				• Light ON/ Dark ON selectable • 12 - 24 VDC • IP67, IP69k
Housing size	M18				
Connection	 Cable: PVC Cable connector: M8, M12, customer specific Connector: M12				
Page	A-17				

Square Photoelectric Sensors - General Purpose

				
Housing	Square			
Model	E3Z			
Type	Compact, general purpose			
Order reference	E3Z-LS	E3Z-D□2 E3Z-D□7	E3Z-R	E3Z-T□2 E3Z-T□7
	Distance setting (BGS, FGS)	Diffuse reflective	Retroreflective	Through-beam
Housing material	Plastic (PBT)			
Features	• Compact housing size and high power LED for excellent performance-size ratio. • Cest value-performance ratio for standard applications. • Intensive shielding for highest noise immunity (EMC). • Tough PBT housing for high mechanical resistance.			
	• Background suppression for reliable detection with changing backgrounds. • Foreground suppression for reliable detection of objects (e.g. glossy and structured) on conveyors.	• Standard beam for long distance detection.	• Polarizing (MSR) for reliable detection of shiny objects (red LED).	• High power infrared LED for increased sensing distance and high reliability in dirty environments.
Max. Sensing Distance	200 mm	1 m	4 m	15 m (typical 45 m)
Light source	Red LED Infrared LED			
Key specifications	• Light ON/Dark ON selectable • 10 - 24 VDC • IP67, IP69k			
Housing size	11 x 17 x 31 mm (W x H x D)			
Connection	Cable: PVC Cable connector: M8, M12, customer specific Connector: M12			
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Square Photoelectric Sensors - General Purpose

				
Housing	Square			
Model	E3T			
Type	Miniature			
Order reference	---	E3T-SL E3T-FD	E3T-SR	E3T-ST E3T-FT
	Distance setting (BGS, FGS)	Diffuse reflective	Retroreflective	Through-beam
Housing material	---	Plastic (PBT)		
Features		• Ultra small size with high output pin point LED where space is crucial. • 3.5 mm thin flat shape or 7 mm side side view shape.		
		• Thin beam for precision detection of miniature objects (min 0.15 mm dia).	• Thin visible beam for precision positioning.	• Unmatched precision - sensor size ratio.
Max. Sensing Distance		30 mm	200 mm	1 m
Light source		Red LED		
Key specifications		• Light ON or Dark ON • 10 - 24 VDC • IP67		
Housing size		Flat: 12 x 21 x 3.5 mm (W x H x D) Side view: 7 x 21 x 11 mm (W x H x D)		
Connection		Cable: PVC Cable connector: M8, M12, customer specific		
Page	A-67			

				
Housing	Square			
Model	E3NT			
Type	Long distance, high functionality, high protection			
Order reference	E3NT-L□-20	---	E3NT-R	E3NT-T
	Distance setting (BGS, FGS)	Diffuse reflective	Retroreflective	Through-beam
Housing material	Aluminium die cast			
Features	• Durable aluminium housing for highest resistance in harsh environments.			
	• One button teaching for quick set up. • Double triangulation for highest reliability detecting glossy objects. • Window heating for reliable operation in icy and foggy environments. • Analog output for distance information.		• Polarizing (MSR) for reliable detection of shiny objects.	
Max. Sensing Distance	3 m		16 m	
Light source	Infrared LED			
Key specifications	• Two freely configurable output (e.g. NO, NC, NO+NC, window function for BGS type (2 different switching points). • 10 - 30 VDC • IP67, IP69k			
Housing size	27 x 89 x 65 mm (W x H x D)			
Connection	Connector: M12			
Page	A-83			

Square Photoelectric Sensors - General Purpose

					
Housing	Square				
Model	E3S-C				
Type	Compact, high protection				
Order reference	E3S-CD	E3S-CR	E3S-CT	E3S-CL1	E3S-CL2
	Diffuse reflective	Retroreflective	Through-beam	Distance setting (BGS, FGS)	
Housing material	Zinc diecast				
Features	• High water, oil and detergent resistance for long life in often cleaned or aggressive environments. • Enhanced performance at slightly larger housing compared with E3Z.				
	• Fuzzy logic interference prevention enables minimal mutual interference for close mounting of two sensors.	• Polarizing (MSR) for reliable detection of shiny objects.	• High power infrared LED for long distance detection. • Precision detection of miniature objects (min 0.5 mm dia) with slits .	• Minimal black/white error (2%) for highest reliability in detecting different colored objects.	• Higher sensing distance but also higher black/white error compared to E3S-CL1. • Invisible light.
Max. Sensing Distance	2 m	3 m (typical 4 m)	30 m	200 mm	500 mm
Light source	Infrared LED	Red LED	Infrared LED	Red LED	Infrared LED
Key specifications	• Light ON/Dark ON selectable • 10 - 30 VDC • IP67				
Housing size	20 x 57 x 23 mm (W x H x D)			15 x 42 x 40 mm (W x H x D)	
Connection	Cable: PVC Cable connector: M8, M12, customer specific				
Page	A-101			A-111	

Housing	Square			
Model	E3G			
Type	Long distance			
Order reference	E3G-L7	---	E3G-R	---
	Distance setting (BGS, FGS)	Diffuse reflective	Retroreflective	Through-beam
Housing material	Plastic (PBT)	---	Plastic (PBT)	---
Features	• One-touch teaching for quick set up. • High power infrared LED for stable detection of structured objects in long distances.		• High power visible light LED for precision detection in long distances.	
Max. Sensing Distance	2 m		10 m	
Light source	Infrared LED		Red LED	
Key specifications	• Light ON/Dark ON selectable • 10 - 30 VDC • IP67		• Light ON/Dark ON selectable • 10 - 30 VDC • IP67	
Housing size	21 x 68 x 48 mm (W x H x D)		21 x 68 x 48 mm (W x H x D)	
Connection	Cable: PVC Cable connector: M8, M12, customer specific Connector: M12 (turnable)		Cable: PVC Cable connector: M8, M12, customer specific Connector: M12 (turnable)	
Page	(CD)		A-119	

Special Square Photoelectric Sensors

					
Housing	Square				
Model	E3Z				
Type	Special functions within compact size E3Z family				
Order reference	E3Z-LS□3 E3Z-LS□8	E3Z-L	E3Z-D□1 E3Z-D□6	E3Z-T□1 E3Z-T□6	E3Z-T□2 E3Z-T□7
	Distance setting (BGS, FGS)	Diffuse reflective		Through-beam	
Housing material	Plastic (PBT)				
Features	• Compact housing size and high power LED for excellent performance-size ratio. • Best value-performance ratio for standard applications.				
	• Thin beam and 2 mm spot size.	• Narrow beam	• Wide beam	• Precision detection of miniature objects (min 0.2 mm dia) with slits. • Precision positioning through visible light. • Close mounting (in a stack) with mutual interference prevention filters.	• Ultra high power infrared LED for very long sensing distance and maximum reliability in dirty environments.
Application areas	• Precision positioning.	• Miniature object detection (0.1 mm dia).	• Reliable detection of structured and uneven objects.	• Precision detection. • Movement precision passage detection.	• Dusty environments • Passage detection over long distances.
Max. Sensing Distance	80 mm	90 mm (± 30 mm)	100 mm	10 m	30 m
Light source		Red LED	Infrared LED	Red LED	Infrared LED
Key specifications	• Light ON/Dark ON selectable • 10 - 24 VDC • IP67, IP69k				
Housing size	11 x 17 x 31 mm (W x H x D)				
Connection	Cable: PVC Cable connector: M8, M12, customer specific Connector: M8				
Page	A-43				

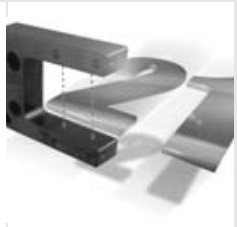
						
Housing	Square					
Model	E3Z-□H			E3Z		
Type	Compact, tampering protection			Preventive maintenance		
Order reference	E3Z-D□H E3Z-L□H	E3Z-R□H	E3Z-T□H	E3Z-□-G0□ for 'Emission stop' E3Z-□-G2□ for 'Emission reduction' E3Z-□-J0□ for 'self diagnosis'		
	Diffuse reflective	Retroreflective	Through-beam	Diffuse reflective	Retroreflective	Through-beam
Housing material	Plastic (PBT)					
Features	• Sensors without sensitivity adjuster for maximum tampering protection.					
	• Same as for general purpose E3Z but without adjuster for			• Machine stop or sensor defect alarm output if beam interruption is too long. • Active sensor check by test input forcing state change at receiver. • Detection of dirt cover by power reduction.		
Application areas	• Conveying applications and other passage detections where malfunctions due to unskilled personal need to be prevented			• Preventive maintenance for all machines requiring maximum machine availability during production.		
Max. Sensing Distance	Same as for general purpose E3Z			Same as for general purpose E3Z		
Light source						
Key specifications						
Housing size						
Connection						
Page	A-43					

Special Square Photoelectric Sensors

					
Housing	Square				
Model	E3NT			E3G	
Type	Long distance, high functionality, high protection.			Special functions within long distance E3G family.	
Order reference	E3NT-L17 E3NT-L37	E3NT-LH	E3NT-L27 E3NT-L47	E3G-L1	E3G-L3
	Distance setting (BGS, FGS)			Distance setting (BGS, FGS)	
Housing material	Aluminium die cast			Plastic (PBT)	
Features	• Durable aluminium housing for highest resistance in harsh environments.			• One-touch teaching for quick set up.	
	• High response time.	• Window heating for reliable operation in humid and icy environments.	• Analog output for quick and easy distance information.	• Shine-proof optical system for reliable detection of different colored objects.	• Optimised sensing distance-minimal object size ratio.
Application areas	• Long distance counting applications.	• Object detection in low temperature (-40 °C) or areas with steam.	• Approach detection of moving objects.	• Passage detection of differently colored objects.	• Higher sensing distance passage detection of differently colored objects - requires larger objects than E3G-L1.
Max. Sensing Distance	2 m			50 mm	200 mm
Light source	Infrared LED			Red LED	Infrared LED
Key specifications	• Two freely configurable output (e.g. NO, NC, NO+NC, window function (2 different switching points). • 10 - 30 VDC • IP67, IP69k			• Light ON/Dark ON selectable • 10 - 30 VDC • IP67	
Housing size	27 x 89 x 65 mm (W x H x D)			18 x 40 x 30 mm (W x H x D)	
Connection	Connector: M12			Cable: PVC Cable connector: M8, M12, customer specific Connector: M8	
Page	A-83			A-119	

					
Housing	Square				
Model	E3M-V	E3S-LS3	E3JK	F3C-AA	F3C-AL
Type	Mark Sensor	PCB detection sensor	All voltage (AC and DC)	Conveyor sensor	Distance settable Laser sensor
Order reference	E3MV	E3S-LS3	E3JK	F3C-AA	F3C-AL
	Distance setting	Diffuse reflective	Through beam Retroreflective Diffuse reflective	Distance setting (BGS, FGS)	Distance setting (BGS, FGS)
Housing material	Plastic (PBT)		Plastic (ABS)		
Features	• Auto-teaching for simple teaching during settup. • Coaxial optical system for reliable mark detection on laminated objects.	• Wide beam for reliable structured object detecion (objects with holes and different heights).	• 12 - 240 VDC or 24 - 240 VAC power supply voltage. • Product variety reduction through 'one sensor fits all requirements'.	• Special housing shape fitting between conveyor segments. • Reliable detection of multicolored objects even in changing backgrounds. • Optionally with integrated jamming control unit.	• Small spot for high precision detection and positioning.
Application areas	• Mark detection on food packages on conveyors.	• PCB detection on conveyors.	• Installations of all standard power supplies for minimal product variety.	• Conveyor belts	• Counting and positioning on conveyors.
Max. Sensing Distance	10+3 mm	60 mm	5 m	900 mm	700 mm
Light source	Green LED	Red LED	Red LED, Infrared LED	Infrared LED	Pulsed RED Laser class II
Key specifications	• 10 - 30 VDC • IP67	• Light ON • 12 - 24 VDC • IP40	• Light ON/ Dark ON or selectable • Relay output with 250 VAC, 3 A • IP64	• Dark ON • 10 - 30 VDC • IP54	• Light ON / Dark ON selectable • 10 - 30 VDC • IP40
Housing size	21 x 67.8 x 47.8 mm (W x H x D)	10 x 34 x 19 mm (W x H x D)	18 x 50 x 50 mm (W x H x D)	18 x 90 x 45 mm (W x H x D)	18 x 90 x 45 mm (W x H x D)
Connection	Cable: PVC Connector: M12	Cable: PVC Cable connector: M8	Cable: PVC	Cable connector: M12	Cable connector: M12
Page	A-133	A-145	A-149	(CD)	(CD)

Special Square Photoelectric Sensors

					
Housing	Square				
Model	E3S-G	E3MC	E3X-NL	E3Z-B	E3Z-G
Type	Mark Sensor	RGB Color sensor	Glossy object sensor	PET bottle sensor	Fork sensor
Order reference	E3S-GS1	E3MC	E3X-NL	E3Z-B	E3Z-G
	Through beam	Fixed distance	Fixed Diffuse reflective	Retroreflective	Through-beam
Housing material	Plastic	Zinc diecast	PBT and ABS	Plastic (PBT)	Plastic (PBT)
Features	• Simple installation and enhanced reliability against setup misalignment.	• 4 channel models for multi product teaching • analog output for continuous color differenciation	• Teaching and unique optical system for reliable and simple gloss level detection.	• Inner View optical system for reliable. PET bottle detection.	• Simple installation and enhanced reliability against setup misalignment. • 1 or 2 optical axis.
Application areas	• Mark detection on food packages on conveyors.	• Sorting of differently colored objects and bottles (with through beam fiber type). • Color shade quality control.	• Label detection • Glue detection	• Detection and counting of PET bottles on conveyors.	• Passage detection of cranes, hangsliders and objects.
Max. Sensing Distance	10 mm	60±10 mm 0 - 200 mm	10±3 mm 20±7 mm	2 m	25 mm
Light source	Green or Red LED	RGB LEDs	Red LED	Red LED	Infrared LED
Key specifications	• 12 - 24 VDC • IP65	• 12 - 24 VDC • IP66	• 12 - 24 VDC • IP50	• Light ON/Dark ON selectable • 12 - 24 VDC • IP67, IP69k	• Light ON/Dark ON selectable • 12 - 24 VDC • IP64
Housing size	20 x 55 x 60 mm (W x H x D) Forkopening: 10 x 35 mm	30 x 53 x 80 mm (W x H x D)	10.4 x 29 x 29 mm (W x H x D)	11 x 17 x 31 mm (W x H x D)	40 x 11 x 50 mm (W x H x D) Forkopening: 25 x 35 mm
Connection	Cable: PVC	Connector: M12	Cable: PVC	Cable: PVC Cable connector: M8, M12 Connector: M8	Cable: PVC Cable connector: M8, M12
Page	Please contact your OMRON representative	(CD)	(CD)	A-43	A-43

		
Housing		Square
Model	E3S-CR	F3UV
Type	Transparent bottle sensor	UV Power Monitor
Order reference	E3S-CR	F3UV
	Retroreflective	Intensity monitor
Housing material	Zinc diecast	Zinc diecast
Features	• Special optic design for reliable detection of glass bottles compensating 'double-detection-effect'.	• Reliable UV light intensity monitoring up to 300 mW/cm². • Heat resistant up to 300 °C.
Application areas	• Detection and counting of transparent glass bottles on conveyors.	• UV light deterioration in food processing. • Resin hardening process.
Max. Sensing Distance	1 m	n.a.
Light source	Red LED	n.a.
Key specifications	• Light ON/Dark ON selectable • 10 - 30 VDC • IP67	• Analog output 1 - 5 V • 12 - 24 VDC • IP30
Housing size	20 x 57 x 23 mm (W x H x D)	16.4 x 19.4 x 35.5 mm (W x H x D)
Connection	Cable: PVC Connector: M12	Cable: PVC
Page	A-157	(CD)

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E33E-EN-01

Cylindrical photoelectric sensors in M18 plastic, brass or stainless steel housings

E3F2

- Large standard portfolio in plastic, brass or stainless steel housings
- Long distance types for highest reliability in dirty environments
- Radial (90°) types for easy mounting and adjustment
- Background suppression model with high precision beam for highest accuracy
- AC and DC switching types

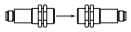
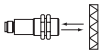
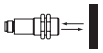
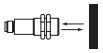
Features

- M18 DIN-sized cylindrical housing
- Housing materials: plastic, nickel plated brass and stainless steel
- Axial and radial types (with integrated 90°-optics)
- Enclosure rating IP67
- DC switching types with connectors for easy maintenance
- Full metal plug-in type
- Sensing distance separate types : 7 m, 10 m
- Retroreflective polarizing types: 2 m, 4 m
- Background suppression type: 10 cm
- Long detection distance (0.3 m, 1 m) with sensitivity adjuster for diffuse type
- Wide-beam characteristics (10 cm) for diffuse type
- Wide operating voltage range (10 to 30 VDC or 24 to 240 VAC)
- Short-circuit and reverse connection protection (DC switching type)
- UL and CSA approved (AC switching types)
- UL listed (DC switching types)

Selection Guide

DC-Switching Models

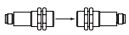
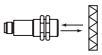
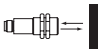
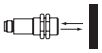
Housing Material: Plastic

Sensing method			Appearance	Connection method	Sensing distance	Model	
						PNP output	NPN output
Through-beam	Multi purpose		 axial	pre-wired	7 m	**E3F2-7B4**	**E3F2-7C4**
				M12 connector		**E3F2-7B4-P1**	**E3F2-7C4-P1**
	- precision detection (*1) - test input			pre-wired	10 m	**E3F2-10B4**	**E3F2-10C4**
				M12 connector		**E3F2-10B4-P1**	**E3F2-10C4-P1**
Retro-reflective(*2)	Non-polarizing (without MSR function)		 axial	pre-wired	0.1 - 2 m(*3)	**E3F2-R2B4-E**	**E3F2-R2C4-E**
				M12 connector		**E3F2-R2B4-P1-E**	**E3F2-R2C4-P1-E**
	Polarizing (with MSR function)	Fixed sensitivity		pre-wired	0.1 - 4 m(*4)	**E3F2-R4B4F-E**	**E3F2-R4C4F-E**
				M12 connector		**E3F2-R4B4F-P1-E**	**E3F2-R4C4F-P1-E**
		Adjustable sensitivity		pre-wired		**E3F2-R4B4-E**	**E3F2-R4C4-E**
				M12 connector		**E3F2-R4B4-P1-E**	**E3F2-R4C4-P1-E**
	Non-polarizing (without MSR function)		 radial	pre-wired	0.1 - 2 m(*3)	–	–
				M12 connector		–	–
	Polarizing (with MSR function)			pre-wired		**E3F2-R2RB41-E**	**E3F2-R2RC41-E**
				M12 connector		**E3F2-R2RB41-P1-E**	**E3F2-R2RC41-P1-E**
Diffuse reflective	Fixed sensitivity Wide-beam characteristics		 axial	pre-wired	0.1 m	**E3F2-DS10B4-N**	**E3F2-DS10C4-N**
				M12 connector		**E3F2-DS10B4-P1**	**E3F2-DS10C4-P1**
	Adjustable sensitivity			pre-wired	0.3 m	**E3F2-DS30B4**	**E3F2-DS30C4**
				M12 connector		**E3F2-DS30B4-P1**	**E3F2-DS30C4-P1**
				pre-wired	1 m	**E3F2-D1B4**	**E3F2-D1C4**
				M12 connector		**E3F2-D1B4-P1**	**E3F2-D1C4-P1**
	Fixed sensitivity Wide-beam characteristics		 radial	pre-wired	0.1 m	–	–
				M12 connector		–	–
	Adjustable sensitivity			pre-wired	0.3 m	**E3F2-DS30B41**	**E3F2-DS30C41**
				M12 connector		**E3F2-DS30B41-P1**	**E3F2-DS30C41-P1**
Background suppression	Fixed sensing distance		 axial	pre-wired	10 cm	**E3F2-LS10B4**	**E3F2-LS10C4**
				M12 connector		**E3F2-LS10B4-P1**	**E3F2-LS10C4-P1**

(*1) with slit E39-ES18
(*2) Retroreflective models incl. reflectors E39-R1 or E39-R1S are also available
(*3) with reflector E39-R1
(*4) with reflector E39-R1S

Note: Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2RB4 2M or E3F2-R2RB4 5M). For other cable length please contact your OMRON sales representative.

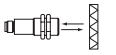
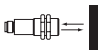
Housing material: Metal (Nickel plated brass)

Sensing method			Appearance	Connection method	Sensing distance	Model	
						PNP output	NPN output
Through-beam	Multi purpose		 axial	pre-wired	7 m	**E3F2-7B4-M**	**E3F2-7C4-M**
				M12 connector		**E3F2-7B4-M1-M**	**E3F2-7C4-M1-M**
	- precision detection - test input			pre-wired	10 m	**E3F2-10B4-M**	**E3F2-10C4-M**
				M12 connector		**E3F2-10B4-M1-M**	**E3F2-10C4-M1-M**
Retro-reflective(*1)	Non-polarizing (without MSR function)		 axial	pre-wired	0.1 - 2 m(*2)	–	–
				M12 connector		–	–
	Polarizing (with MSR function)	Fixed sensivity		pre-wired		**E3F2-R2RB4-M-E**	**E3F2-R2RC4-M-E**
				M12 connector		**E3F2-R2RB4-M1-M-E**	**E3F2-R2RC4-M1-M-E**
				pre-wired	0.1 - 4 m(*3)	**E3F2-R4B4F-M-E**	**E3F2-R4C4F-M-E**
				M12 connector		**E3F2-R4B4F-M1-M-E**	**E3F2-R4C4F-M1-M-E**
		Adjustable sensivity		pre-wired		**E3F2-R4B4-M-E**	**E3F2-R4C4-M-E**
				M12 connector		**E3F2-R4B4-M1-M-E**	**E3F2-R4C4-M1-M-E**
	Non-polarizing (without MSR function)		 radial	pre-wired	0.1 - 2 m(*2)	–	–
				M12 connector		–	–
	Polarizing (with MSR function)			pre-wired		**E3F2-R2RB41-M-E**	**E3F2-R2RC41-M-E**
				M12 connector		**E3F2-R2RB41-M1-M-E**	**E3F2-R2RC41-M1-M-E**
Diffuse reflective	Fixed sensing distance Wide-beam characteristics		 axial	pre-wired	0.1 m	**E3F2-DS10B4-M**	**E3F2-DS10C4-M**
				M12 connector		**E3F2-DS10B4-M1-M**	**E3F2-DS10C4-M1-M**
	Adjustable sensing distance			pre-wired	0.3 m	**E3F2-DS30B4-M**	**E3F2-DS30C4-M**
				M12 connector		**E3F2-DS30B4-M1-M**	**E3F2-DS30C4-M1-M**
				pre-wired	1 m	**E3F2-D1B4-M**	**E3F2-D1C4-M**
				M12 connector		**E3F2-D1B4-M1-M**	**E3F2-D1C4-M1-M**
	Fixed sensing distance Wide-beam characteristics		 radial	pre-wired	0.1 m	–	–
				M12 connector		–	–
	Adjustable sensing distance			pre-wired	0.3 m	**E3F2-DS30B41-M**	**E3F2-DS30C41-M**
				M12 connector		**E3F2-DS30B41-M1-M**	**E3F2-DS30C41-M1-M**
Background suppression	Fixed sensing distance		 axial	pre-wired	10 cm	**E3F2-LS10B4-M**	**E3F2-LS10C4-M**
				M12 connector		**E3F2-LS10B4-M1-M**	**E3F2-LS10C4-M1-M**

(*1) Retroreflective models incl. reflector E39-R1 are also available
(*2) with reflector E39-R1
(*3) with reflector E39-R1S

Note: Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2RB4-M 2M or E3F2-R2RB4-M 5M). For other cable length please contact your OMRON sales representative.

Housing material: Metal (Stainless steel)

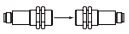
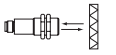
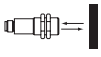
Sensing method		Appearance	Connection method	Sensing distance	Model	
					PNP output	NPN output
Through-beam		 axial	pre-wired	7 m	**E3F2-7B4-S**	**E3F2-7C4-S**
			M12 connector		**E3F2-7B4-M1-S**	**E3F2-7C4-M1-S**
Retro-reflective(*1)	Non-polarizing (without MSR function)	 axial	pre-wired	0.1 - 2 m (with reflector E39-R1)	–	–
			M12 connector		–	–
	Polarizing (with MSR function)		pre-wired		**E3F2-R2RB4-S-E**	**E3F2-R2RC4-S-E**
			M12 connector		**E3F2-R2RB4-M1-S-E**	**E3F2-R2RC4-M1-S-E**
	Non-polarizing (without MSR function)	 radial	pre-wired		–	–
			M12 connector		–	–
	Polarizing (with MSR function)		pre-wired		–	–
			M12 connector		–	–
Diffuse reflective	Fixed sensitivity Wide-beam characteristics	 axial	pre-wired	0.1 m	**E3F2-DS10B4-S**	**E3F2-DS10C4-S**
			M12 connector		**E3F2-DS10B4-M1-S**	**E3F2-DS10C4-M1-S**
	Adjustable sensitivity		pre-wired	0.3 m	**E3F2-DS30B4-S**	**E3F2-DS30C4-S**
			M12 connector		**E3F2-DS30B4-M1-S**	**E3F2-DS30C4-M1-S**
	Fixed sensitivity Wide-beam characteristics	 radial	pre-wired	0.1 m	–	–
			M12 connector		–	–
	Adjustable sensitivity		pre-wired	0.3 m	–	–
			M12 connector		–	–
Background suppression		Please contact your OMRON sales representative for these models				

(*1) Retroreflective models incl. reflector E39-R1 are also available

Note: Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2RB4-S 2M or E3F2-R2RB4-S 5M). For other cable length please contact your OMRON sales representative.

AC-Switching Models

Housing material: Plastic

Sensing method		Appearance	Connection method	Sensing distance	Model	
					Light-ON	Dark-ON
Through-beam		 axial	pre-wired	3 m	**E3F2-3Z1**	**E3F2-3Z2**
Retro-reflective(*1)	Non-polarizing (without MSR function)	 axial	pre-wired	0.1 - 2 m (with reflector E39-R1)	**E3F2-R2Z1-E**	**E3F2-R2Z2-E**
Diffuse reflective	Fixed sensing distance Wide-beam characteristics	 axial	pre-wired	0.1 m	**E3F2-DS10Z1-N**	**E3F2-DS10Z2-N**

(*1) Retroreflective models incl. reflector E39-R1 are also available

Note: Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2Z1 2M or E3F2-R2Z1 5M). For other cable length please contact your OMRON sales representative.

Accessories (Order Separately)

Name	Sensing distance (typical) [1.]	Model	Remark
Reflectors	0.1 - 3.7 m (axial) 0.1 - 2.4 m (radial)	**E39-R1**	60 x 40 mm (included in some models)
	0.1 - 4.3 m (axial)	**E39-R1S**	for E3F2-R4
	0.1 - 4.2 m (axial) 0.1 - 2.7 m (radial)	**E39-R7**	84 mm
	0.1 - 5.3 m (axial) 0.1 - 3.1 m (radial)	**E39-R8**	100 x 100 mm
	0.1 - 4.3 m (axial)	**E39-R40**	80 x 80 mm
Tape Reflectors		**E39-RSA**	35 x 10 mm
		E39-RSB	35 x 40 mm
		E39-RS3	80 x 70 mm
Lens Cap		**E39-F31**	
Mounting Bracket		**Y92E-B18**	screw mount
		Y92E-G18	quick access mounting
Slit		**E39-ES18**	for E3F2-10□ - precision detection

For detailed information about Accessories, refer to the main chapter “Accessories” at the end of the document.
Note: 1 . Typical sensing distance corresponds to 80 % of the max. sensing distance. For details, please refer to “Engineering Data”.

Sensor I/O Connectors

Cord	Shape	Cable type		Model
Standard	Straight 	2 m	Four-wire type	**XS2F-D421-D80-A**
		5 m		**XS2F-D421-G80-A**
	L-shaped 	2 m		**XS2F-D422-D80-A**
		5 m		**XS2F-D422-G80-A**
Vibration-proof robot cable	Straight 	2 m		**XS2F-D421-D80-R**
		5 m		**XS2F-D421-G80-R**
	L-shaped 	2 m		**XS2F-D422-D80-R**
		5 m		**XS2F-D422-G80-R**

Ordering Information: type list

DC-Switching Models, plastic

Model	Sensing method, sensing distance	Appearance	Connection (cable-length)	Control output	Comments
E3F2-7B4 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	PNP	Receiver and Emitter
E3F2-7B4-P1	Through-beam, 7 m	axial	Connector	PNP	Receiver and Emitter
E3F2-7C4 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	NPN	Receiver and Emitter
E3F2-7C4-P1	Through-beam, 7 m	axial	Connector	NPN	Receiver and Emitter
E3F2-7DB4 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	PNP	Receiver only
E3F2-7DB4-P1	Through-beam, 7 m	axial	Connector	PNP	Receiver only
E3F2-7DC4 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	NPN	Receiver only
E3F2-7DC4-P1	Through-beam, 7 m	axial	Connector	NPN	Receiver only
E3F2-7L 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	N.A.	Emitter only
E3F2-7L -P1	Through-beam, 7 m	axial	Connector	N.A.	Emitter only
E3F2-10B4 2M	Through-beam, 10m	axial	Pre-wired (2m)*	PNP	Receiver and Emitter (precision detection and test input)
E3F2-10B4-P1	Through-beam, 10m	axial	Connector	PNP	Receiver and Emitter (precision detection and test input)
E3F2-10DB4 2M	Through-beam, 10m	axial	Pre-wired (2m)*	PNP	Receiver only (precision detection and test input)
E3F2-10DB4-P1	Through-beam, 10m	axial	Connector	PNP	Receiver only (precision detection and test input)
E3F2-10C4 2M	Through-beam, 10m	axial	Pre-wired (2m)*	NPN	Receiver and Emitter (precision detection and test input)
E3F2-10C4-P1	Through-beam, 10m	axial	Connector	NPN	Receiver and Emitter (precision detection and test input)
E3F2-10DC4 2M	Through-beam, 10m	axial	Pre-wired (2m)*	NPN	Receiver only (precision detection and test input)
E3F2-10DC4-P1	Through-beam, 10m	axial	Connector	NPN	Receiver only (precision detection and test input)
E3F2-10LB 2M	Through-beam, 10m	axial	Pre-wired (2m)*	PNP	Emitter only (precision detection and test input)
E3F2-10LB-P1	Through-beam, 10m	axial	Connector	PNP	Emitter only (precision detection and test input)
E3F2-DS10B4-N 2M	Diffuse reflective, 0.1 m	axial	Pre-wired (2 m)*	PNP	Wide-beam characteristic
E3F2-DS10B4-P1	Diffuse reflective, 0.1 m	axial	Connector	PNP	Wide-beam characteristic
E3F2-DS10C4-N 2M	Diffuse reflective, 0.1 m	axial	Pre-wired (2 m)*	NPN	Wide-beam characteristic
E3F2-DS10C4-P1	Diffuse reflective, 0.1 m	axial	Connector	NPN	Wide-beam characteristic
E3F2-DS30B4 2M	Diffuse reflective, 0.3 m	axial	Pre-wired (2 m)*	PNP	Sensitivity adjuster
E3F2-DS30B41 2M	Diffuse reflective, 0.3 m	radial	Pre-wired (2 m)*	PNP	Sensitivity adjuster
E3F2-DS30B41-P1	Diffuse reflective, 0.3 m	radial	Connector	PNP	Sensitivity adjuster
E3F2-DS30B4-P1	Diffuse reflective, 0.3 m	axial	Connector	PNP	Sensitivity adjuster
E3F2-DS30C4 2M	Diffuse reflective, 0.3 m	axial	Pre-wired (2 m)*	NPN	Sensitivity adjuster
E3F2-DS30C41 2M	Diffuse reflective, 0.3 m	radial	Pre-wired (2 m)*	NPN	Sensitivity adjuster
E3F2-DS30C41-P1	Diffuse reflective, 0.3 m	radial	Connector	NPN	Sensitivity adjuster
E3F2-DS30C4-P1	Diffuse reflective, 0.3 m	axial	Connector	NPN	Sensitivity adjuster
E3F2-D1B4 2M	Diffuse reflective, 1 m	axial	Pre-wired (2 m)*	PNP	Sensitivity adjuster
E3F2-D1B4-P1	Diffuse reflective, 1 m	axial	Connector	PNP	Sensitivity adjuster
E3F2-D1C4 2M	Diffuse reflective, 1 m	axial	Pre-wired (2 m)*	NPN	Sensitivity adjuster
E3F2-D1C4-P1	Diffuse reflective, 1 m	axial	Connector	NPN	Sensitivity adjuster
E3F2-LS10B4 2M	Background suppression, 10 cm	axial	Pre-wired (2 m)*	PNP	Background suppression
E3F2-LS10B4-P1	Background suppression, 10 cm	axial	Connector	PNP	Background suppression
E3F2-LS10C4 2M	Background suppression, 10 cm	axial	Pre-wired (2 m)*	NPN	Background suppression
E3F2-LS10C4-P1	Background suppression, 10 cm	axial	Connector	NPN	Background suppression
E3F2-R2B4 2M	Retroreflective, 2 m	axial	Pre-wired (2 m)*	PNP	Non-polarizing
E3F2-R2B4-E 2M	Retroreflective, 2 m	axial	Pre-wired (2 m)*	PNP	Non-polarizing, including reflector
E3F2-R2B4-P1	Retroreflective, 2 m	axial	Connector	PNP	Non-polarizing
E3F2-R2B4-P1-E	Retroreflective, 2 m	axial	Connector	PNP	Non-polarizing, including reflector
E3F2-R2C4 2M	Retroreflective, 2 m	axial	Pre-wired (2 m)*	NPN	Non-polarizing
E3F2-R2C4-E 2M	Retroreflective, 2 m	axial	Pre-wired (2 m)*	NPN	Non-polarizing, including reflector
E3F2-R2C4-P1	Retroreflective, 2 m	axial	Connector	NPN	Non-polarizing
E3F2-R2C4-P1-E	Retroreflective, 2 m	axial	Connector	NPN	Non-polarizing, including reflector

Model	Sensing method, sensing distance	Appearance	Connection (cable-length)	Control output	Comments
E3F2-R2RB41 2M	Retroreflective, 2 m	radial	Pre-wired (2 m)*	PNP	Polarizing
E3F2-R2RB41-E 2M	Retroreflective, 2 m	radial	Pre-wired (2 m)*	PNP	Polarizing, including reflector
E3F2-R2RB41-P1	Retroreflective, 2 m	radial	Connector	PNP	Polarizing
E3F2-R2RB41-P1-E	Retroreflective, 2 m	radial	Connector	PNP	Polarizing, including reflector
E3F2-R2RC41 2M	Retroreflective, 2 m	radial	Pre-wired (2 m)*	NPN	Polarizing
E3F2-R2RC41-E 2M	Retroreflective, 2 m	radial	Pre-wired (2 m)*	NPN	Polarizing, including reflector
E3F2-R2RC41-P1	Retroreflective, 2 m	radial	Connector	NPN	Polarizing
E3F2-R2RC41-P1-E	Retroreflective, 2 m	radial	Connector	NPN	Polarizing, including reflector
E3F2-R4B4 2M	Retroreflective, 4m	axial	Pre-wired (2m)*	PNP	Polarizing, sensitivity adjuster
E3F2-R4B4-E 2M	Retroreflective, 4m	axial	Pre-wired (2m)*	PNP	Polarizing, sensitivity adjuster, incl. reflector
E3F2-R4B4F 2M	Retroreflective, 4m	axial	Pre-wired (2m)*	PNP	Polarizing, fixed sensitivity
E3F2-R4B4F-E 2M	Retroreflective, 4m	axial	Pre-wired (2m)*	PNP	Polarizing, fixed sensitivity incl. reflector
E3F2-R4C4 2M	Retroreflective, 4m	axial	Pre-wired (2m)*	NPN	Polarizing, sensitivity adjuster
E3F2-R4C4-E 2M	Retroreflective, 4m	axial	Pre-wired (2m)*	NPN	Polarizing, sensitivity adjuster, incl. reflector
E3F2-R4C4F 2M	Retroreflective, 4m	axial	Pre-wired (2m)*	NPN	Polarizing, fixed sensitivity
E3F2-R4C4F-E 2M	Retroreflective, 4m	axial	Pre-wired (2m)*	NPN	Polarizing, fixed sensitivity incl. reflector
E3F2-R4B4-P1	Retroreflective, 4m	axial	Connector	PNP	Polarizing, sensitivity adjuster
E3F2-R4B4-P1-E	Retroreflective, 4m	axial	Connector	PNP	Polarizing, sensitivity adjuster, incl. reflector
E3F2-R4B4F-P1	Retroreflective, 4m	axial	Connector	PNP	Polarizing, fixed sensitivity
E3F2-R4B4F-P1-E	Retroreflective, 4m	axial	Connector	PNP	Polarizing, fixed sensitivity incl. reflector
E3F2-R4C4-P1	Retroreflective, 4m	axial	Connector	NPN	Polarizing, sensitivity adjuster
E3F2-R4C4-P1-E	Retroreflective, 4m	axial	Connector	NPN	Polarizing, sensitivity adjuster, incl. reflector
E3F2-R4C4F-P1	Retroreflective, 4m	axial	Connector	NPN	Polarizing, fixed sensitivity
E3F2-R4C4F-P1-E	Retroreflective, 4m	axial	Connector	NPN	Polarizing, fixed sensitivity incl. reflector

* Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2RB41 2M or E3F2-R2RB41 5M). For other cable length please contact your OMRON sales representative.

DC-Switching Models, metal (nickel plated brass)

Model	Sensing method, sensing range	Appearance	Connection (cable-length)	Control output	Comments
E3F2-7B4-M 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	PNP	Receiver and Emitter
E3F2-7B4-M1-M	Through-beam, 7 m	axial	Connector	PNP	Receiver and Emitter
E3F2-7C4-M 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	NPN	Receiver and Emitter
E3F2-7C4-M1-M	Through-beam, 7 m	axial	Connector	NPN	Receiver and Emitter
E3F2-7DB4-M 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	PNP	Receiver only
E3F2-7DB4-M1-M	Through-beam, 7 m	axial	Connector	PNP	Receiver only
E3F2-7DC4-M 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	NPN	Receiver only
E3F2-7DC4-M1-M	Through-beam, 7 m	axial	Connector	NPN	Receiver only
E3F2-7L-M 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	N.A	Emitter only
E3F2-7L-M1-M	Through-beam, 7 m	axial	Connector	N.A	Emitter only
E3F2-10B4-M 2M	Through-beam, 10m	axial	Pre-wired (2m)*	PNP	Receiver and Emitter (precision detection and test input)
E3F2-10B4-M1-M	Through-beam, 10m	axial	Connector	PNP	Receiver and Emitter (precision detection and test input)
E3F2-10DB4-M 2M	Through-beam, 10m	axial	Pre-wired (2m)*	PNP	Receiver only (precision detection and test input)
E3F2-10DB4-M1-M	Through-beam, 10m	axial	Connector	PNP	Receiver only (precision detection and test input)
E3F2-10C4-M 2M	Through-beam, 10m	axial	Pre-wired (2m)*	NPN	Receiver and Emitter (precision detection and test input)
E3F2-10C4-M1-M	Through-beam, 10m	axial	Connector	NPN	Receiver and Emitter (precision detection and test input)
E3F2-10DC4-M 2M	Through-beam, 10m	axial	Pre-wired (2m)*	NPN	Receiver only (precision detection and test input)
E3F2-10DC4-M1-M	Through-beam, 10m	axial	Connector	NPN	Receiver only (precision detection and test input)
E3F2-10LB-M 2M	Through-beam, 10m	axial	Pre-wired (2m)*	PNP	Emitter only (precision detection and test input)

Model	Sensing method, sensing range	Appearance	Connection (cable-length)	Control output	Comments
E3F2-10LB-M 2M	Through-beam, 10m	axial	Pre-wired (2m)*	PNP	Emitter only (precision detection and test input)
E3F2-10LB-M1-M	Through-beam, 10m	axial	Connector	PNP	Emitter only (precision detection and test input)
E3F2-DS10B4-M 2M	Diffuse reflective, 0.1 m	axial	Pre-wired (2 m)*	PNP	Wide-beam characteristic
E3F2-DS10B4-M1-M	Diffuse reflective, 0.1 m	axial	Connector	PNP	Wide-beam characteristic
E3F2-DS10C4-M 2M	Diffuse reflective, 0.1 m	axial	Pre-wired (2 m)*	NPN	Wide-beam characteristic
E3F2-DS10C4-M1-M	Diffuse reflective, 0.1 m	axial	Connector	NPN	Wide-beam characteristic
E3F2-DS30B41-M 2M	Diffuse reflective, 0.3 m	radial	Pre-wired (2 m)*	PNP	Sensitivity adjuster
E3F2-DS30B41-M1-M	Diffuse reflective, 0.3 m	radial	Connector	PNP	Sensitivity adjuster
E3F2-DS30B4-M 2M	Diffuse reflective, 0.3 m	axial	Pre-wired (2 m)*	PNP	Sensitivity adjuster
E3F2-DS30B4-M1-M	Diffuse reflective, 0.3 m	axial	Connector	PNP	Sensitivity adjuster
E3F2-DS30C41-M 2M	Diffuse reflective, 0.3 m	radial	Pre-wired (2 m)*	NPN	Sensitivity adjuster
E3F2-DS30C41-M1-M	Diffuse reflective, 0.3 m	radial	Connector	NPN	Sensitivity adjuster
E3F2-DS30C4-M 2M	Diffuse reflective, 0.3 m	axial	Pre-wired (2 m)*	NPN	Sensitivity adjuster
E3F2-DS30C4-M1-M	Diffuse reflective, 0.3 m	axial	Connector	NPN	Sensitivity adjuster
E3F2-D1B4-M 2M	Diffuse reflective, 1 m	axial	Pre-wired (2m)*	PNP	Sensitivity adjuster
E3F2-D1B4-M1-M	Diffuse reflective, 1 m	axial	Connector	PNP	Sensitivity adjuster
E3F2-D1C4-M 2M	Diffuse reflective, 1 m	axial	Pre-wired (2m)*	NPN	Sensitivity adjuster
E3F2-D1C4-M1-M	Diffuse reflective, 1 m	axial	Connector	NPN	Sensitivity adjuster
E3F2-LS10B4-M 2M	Background suppression, 10 cm	axial	Pre-wired (2m)*	PNP	Background suppression
E3F2-LS10B4-M1-M	Background suppression, 10 cm	axial	Connector	PNP	Background suppression
E3F2-LS10C4-M 2M	Background suppression, 10 cm	axial	Pre-wired (2m)*	NPN	Background suppression
E3F2-LS10C4-M1-M	Background suppression, 10 cm	axial	Connector	NPN	Background suppression
E3F2-R2RB41-M 2M	Retroreflective, 2 m	radial	Pre-wired (2 m)*	PNP	Polarizing
E3F2-R2RB41-M1-M	Retroreflective, 2 m	radial	Connector	PNP	Polarizing
E3F2-R2RB41-M1-M-E	Retroreflective, 2 m	radial	Connector	PNP	Polarizing, including reflector
E3F2-R2RB41-M-E 2M	Retroreflective, 2 m	radial	Pre-wired (2 m)*	PNP	Polarizing, including reflector
E3F2-R2RB4-M 2M	Retroreflective, 2 m	axial	Pre-wired (2 m)*	PNP	Polarizing
E3F2-R2RB4-M1-M	Retroreflective, 2 m	axial	Connector	PNP	Polarizing
E3F2-R2RB4-M1-M-E	Retroreflective, 2 m	axial	Connector	PNP	Polarizing, including reflector
E3F2-R2RB4-M-E 2M	Retroreflective, 2 m	axial	Pre-wired (2 m)*	PNP	Polarizing, including reflector
E3F2-R2RC41-M 2M	Retroreflective, 2 m	radial	Pre-wired (2 m)*	NPN	Polarizing
E3F2-R2RC41-M1-M	Retroreflective, 2 m	radial	Connector	NPN	Polarizing
E3F2-R2RC41-M1-M-E	Retroreflective, 2 m	radial	Connector	NPN	Polarizing, including reflector
E3F2-R2RC41-M-E 2M	Retroreflective, 2 m	radial	Pre-wired (2 m)*	NPN	Polarizing, including reflector
E3F2-R2RC4-M 2M	Retroreflective, 2 m	axial	Pre-wired (2 m)*	NPN	Polarizing
E3F2-R2RC4-M1-M	Retroreflective, 2 m	axial	Connector	NPN	Polarizing
E3F2-R2RC4-M1-M-E	Retroreflective, 2 m	axial	Connector	NPN	Polarizing, including reflector
E3F2-R2RC4-M-E 2M	Retroreflective, 2 m	axial	Pre-wired (2 m)*	NPN	Polarizing, including reflector
E3F2-R4B4-M 2M	Retroreflective, 4m	axial	Pre-wired (2m)*	PNP	Polarizing, sensitivity adjuster
E3F2-R4B4-M-E 2M	Retroreflective, 4m	axial	Pre-wired (2m)*	PNP	Polarizing, sensitivity adjuster, incl. reflector
E3F2-R4B4F-M 2M	Retroreflective, 4m	axial	Pre-wired (2m)*	PNP	Polarizing, fixed sensitivity
E3F2-R4B4F-M-E 2M	Retroreflective, 4m	axial	Pre-wired (2m)*	PNP	Polarizing, fixed sensitivity incl. reflector
E3F2-R4C4-M 2M	Retroreflective, 4m	axial	Pre-wired (2m)*	NPN	Polarizing, sensitivity adjuster
E3F2-R4C4-M-E 2M	Retroreflective, 4m	axial	Pre-wired (2m)*	NPN	Polarizing, sensitivity adjuster, incl. reflector
E3F2-R4C4F-M 2M	Retroreflective, 4m	axial	Pre-wired (2m)*	NPN	Polarizing, fixed sensitivity
E3F2-R4C4F-M-E 2M	Retroreflective, 4m	axial	Pre-wired (2m)*	NPN	Polarizing, fixed sensitivity incl. reflector
E3F2-R4B4-M1-M	Retroreflective, 4m	axial	Connector	PNP	Polarizing, sensitivity adjuster
E3F2-R4B4-M1-M-E	Retroreflective, 4m	axial	Connector	PNP	Polarizing, sensitivity adjuster, incl. reflector
E3F2-R4B4F-M1-M	Retroreflective, 4m	axial	Connector	PNP	Polarizing, fixed sensitivity
E3F2-R4B4F-M1-M-E	Retroreflective, 4m	axial	Connector	PNP	Polarizing, fixed sensitivity incl. reflector
E3F2-R4C4-M1-M	Retroreflective, 4m	axial	Connector	NPN	Polarizing, sensitivity adjuster

Model	Sensing method, sensing range	Appearance	Connection (cable-length)	Control output	Comments
E3F2-R4C4-M1-M-E	Retroreflective, 4m	axial	Connector	NPN	Polarizing, sensitivity adjuster, incl. reflector
E3F2-R4C4F-M1-M	Retroreflective, 4m	axial	Connector	NPN	Polarizing, fixed sensitivity
E3F2-R4C4F-M1-M-E	Retroreflective, 4m	axial	Connector	NPN	Polarizing, fixed sensitivity incl. reflector

* Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2RB41-M 2M or E3F2-R2RB41-M 5M). For other cable length please contact your OMRON sales representative.

DC-Switching Models, metal (stainless steel)

Model	Sensing method, sensing range	Appearance	Connection (cable-length)	Control output	Comments
E3F2-7B4-M1-S	Through-beam, 7 m	axial	Connector	PNP	Receiver and Emitter
E3F2-7B4-S 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	PNP	Receiver and Emitter
E3F2-7C4-M1-S	Through-beam, 7 m	axial	Connector	NPN	Receiver and Emitter
E3F2-7C4-S 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	NPN	Receiver and Emitter
E3F2-7DB4-M1-S	Through-beam, 7 m	axial	Connector	PNP	Receiver only
E3F2-7DB4-S 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	PNP	Receiver only
E3F2-7DC4-M1-S	Through-beam, 7 m	axial	Connector	NPN	Receiver only
E3F2-7DC4-S 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	NPN	Receiver only
E3F2-7L-M1-S	Through-beam, 7 m	axial	Connector	N.A.	Emitter only
E3F2-7L-S 2M	Through-beam, 7 m	axial	Pre-wired (2 m)*	N.A.	Emitter only
E3F2-DS10B4-M1-S	Diffuse reflective, 0.1 m	axial	Connector	PNP	Wide-beam characteristic
E3F2-DS10B4-S 2M	Diffuse reflective, 0.1 m	axial	Pre-wired (2 m)*	PNP	Wide-beam characteristic
E3F2-DS10C4-M1-S	Diffuse reflective, 0.1 m	axial	Connector	NPN	Wide-beam characteristic
E3F2-DS10C4-S 2M	Diffuse reflective, 0.1 m	axial	Pre-wired (2 m)*	NPN	Wide-beam characteristic
E3F2-DS30B4-M1-S	Diffuse reflective, 0.3 m	axial	Connector	PNP	Sensitivity adjuster
E3F2-DS30B4-S 2M	Diffuse reflective, 0.3 m	axial	Pre-wired (2 m)*	PNP	Sensitivity adjuster
E3F2-DS30C4-M1-S	Diffuse reflective, 0.3 m	axial	Connector	NPN	Sensitivity adjuster
E3F2-DS30C4-S 2M	Diffuse reflective, 0.3 m	axial	Pre-wired (2 m)*	NPN	Sensitivity adjuster
E3F2-R2RB4-M1-S	Retroreflective, 2 m	axial	Connector	PNP	Polarizing
E3F2-R2RB4-M1-S-E	Retroreflective, 2 m	axial	Connector	PNP	Polarizing, including reflector
E3F2-R2RB4-S 2M	Retroreflective, 2 m	axial	Pre-wired (2 m)*	PNP	Polarizing
E3F2-R2RB4-S-E 2M	Retroreflective, 2 m	axial	Pre-wired (2 m)*	PNP	Polarizing, including reflector
E3F2-R2RC4-M1-S	Retroreflective, 2 m	axial	Connector	NPN	Polarizing
E3F2-R2RC4-M1-S-E	Retroreflective, 2 m	axial	Connector	NPN	Polarizing, including reflector
E3F2-R2RC4-S 2M	Retroreflective, 2 m	axial	Pre-wired (2 m)*	NPN	Polarizing
E3F2-R2RC4-S-E 2M	Retroreflective, 2 m	axial	Pre-wired (2 m)*	NPN	Polarizing, including reflector

* Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2RB41-S 2M or E3F2-R2RB41-S 5M). For other cable length please contact your OMRON sales representative.

AC-Switching Models, plastic

Model	Sensing method, sensing range	Appearance	Connection (cable-length)	Control output	Comments
E3F2-3LZ 2M	Through-beam, 3 m	axial	Pre-wired (2 m)*	N.A.	Emitter only
E3F2-3DZ1 2M	Through-beam, 3 m	axial	Pre-wired (2 m)*	Light-ON	Receiver only
E3F2-3DZ2 2M	Through-beam, 3 m	axial	Pre-wired (2 m)*	Dark-ON	Receiver only
E3F2-3Z1 2M	Through-beam, 3 m	axial	Pre-wired (2 m)*	Light-ON	Receiver and Emitter
E3F2-3Z2 2M	Through-beam, 3 m	axial	Pre-wired (2 m)*	Dark-ON	Receiver and Emitter
E3F2-R2Z1 2M	Retroreflective, 2 m	axial	Pre-wired (2 m)*	Light-ON	Non-polarizing
E3F2-R2Z2 2M	Retroreflective, 2 m	axial	Pre-wired (2 m)*	Dark-ON	Non-polarizing
E3F2-R2Z1-E 2M	Retroreflective, 2 m	axial	Pre-wired (2 m)*	Light-ON	Non-polarizing, including reflector
E3F2-R2Z2-E 2M	Retroreflective, 2 m	axial	Pre-wired (2 m)*	Dark-ON	Non-polarizing, including reflector
E3F2-DS10Z1-N 2M	Diffuse reflective, 0.1 m	axial	Pre-wired (2 m)*	Light-ON	Wide-beam characteristic
E3F2-DS10Z2-N 2M	Diffuse reflective, 0.1 m	axial	Pre-wired (2 m)*	Dark-ON	Wide-beam characteristic

* Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2Z1 2M or E3F2-R2Z1 5M). For other cable length please contact your OMRON sales representative.

Specifications

Ratings / Characteristics of DC Switching Models

Item	E3F2-7□	E3F2-10□	E3F2-R2□4-□	E3F2-R2R□	E3F2-R4□-□	E3F2-DS10□	E3F2-DS30□	E3F2-D1□4-□	E3F2-LS10□4-□
Sensing method	Through-beam		Retroreflective			Diffuse reflective			
	- multi purpose	- Precision detection [7.] - test input	Non-polarizing	Polarizing		Wide beam characteristic	Adjustable sensing distance		Background suppression
Power supply voltage	10 to 30 V DC	12 to 24 V DC	10 to 30 V DC						
Current consumption	50 mA max.		25 mA max.	30 mA max.		25 mA max.	30 mA max.		
Rated sensing distance [1.]	7 m	10 m	0.1 - 2 m (with reflector E39-R1)		0.1 - 4 m (with reflector E39-R1S)	0.1 m (5 x 5 cm white mat paper)	0.3 m (10 x 10 cm white mat paper)	1 m (30 x 30 cm white mat paper)	0.1 m (10 x 10 cm white mat paper)
Typical sensing distance for different reflector types (ref. to accessories) [2.]	–		E39-R1: 4.0 m E39-R7: 4.5 m E39-R8: 5.3 m	E39-R1: axial 3.7 m radial 2.4 m E39-R7: axial 4.2 m radial 2.7 m E39-R8: axial 5.3 m radial 3.1 m	E39-R1S: 4.3 m E39-R7: 4.8 m E39-R8: 5.6 m E39-R40: 4.3 m E39-RS3: 2 m	–			
Standard object	Opaque: 11 mm dia. min.		Opaque: 56 mm dia. min.			–			
Directional angle	3° to 20°					–			
Differential travel (hysteresis)	–					20% max.			5% max
Black/white error	–								3%
Response time	Operation and Reset: 2.5 ms max.				1 ms max	2.5 ms max.		1 ms max.	
Control output	Transistor (open collector), load current: 100 mA max. (residual voltage: 2 V max.)								
Power reset time	50 ms				100 ms max.	50 ms		100 ms	
Ambient illumination	Incandescent lamp:3000 lx max. / Sunlight:10000 lx max.								
Ambient temperature	Operating: -25 to 55 °C / Storage: -30 to 70 °C (with no icing or condensation)								
Ambient humidity	Operating: 35% to 85% / Storage: 35% to 95% (without condensation)								
Insulation resistance	20 M min. at 500 V DC between energized parts and case								
Dielectric strength	1000 VAC max., 50 / 60 Hz for 1 min between energized parts and case								
Vibration resistance	10 to 55 Hz, 1.5 mm double amplitude for 2 hrs each direction (X, Y, Z)								
Shock resistance	Destruction: 500 m/s^2 each direction (X, Y, Z)								
Enclosure ratings	IP67 [3.]; NEMA 1, 2, 4; IP69k after DIN 40050 part 9								
Light source	Infrared LED (880 nm/850 nm)			Red LED (660 nm)		Infrared LED (880 nm)			Red LED (660 nm)
Indicators	Light incident / power indicator for light source (red)	Output (orange) / light emission (red)	Light incident / power indicator for light source (red)		Light incident (red) / stability (green)	Light incident / power indicator for light source (red)		Light incident (red) / stability (green)	Output indicator (orange) / stability (green)
Sensitivity adjustment	Fixed				Fixed / Adjustable	Fixed	Adjustable		Fixed
Connection method	2 m, 5 m pre-wired cable (PVC, dia. 4 mm (18 / 0.12) [4.]) or M12-connector								
Test Input	–	[8.]	–						
Operation mode	Light-ON or Dark-ON selectable by wiring								
Weight (approx.)									
Plastic case pre-wired (2 m)	120 g		60 g						
Plastic case connector	40 g		20 g						
Metal case pre-wired (2 m)	180 g		90 g						
Metal case connector	120 g		50 g						
Circuit protection	Output short-circuit and power supply reverse polarity								
Housing materials	Plastic (case: ABS; lens: PMMA)								
	Nickel brass	Nickel brass	–	Nickel brass	Nickel brass	Nickel brass	Nickel brass	Nickel brass	Nickel brass
	Stainless steel [5.]	–	–	Stainless steel [5.]	–	Stainless steel [5.]	Stainless steel [5.]	–	– [6.]

Note: 1 . For stable sensing distance in detail, please refer to "Engineering Data"
2 . Typical sensing distance corresponds to 80 % of the max. sensing distance.
3 . The enclosure rating IP67 of OMRON internal standards correspond to stricter test requirements than the standard IEC 60529 (refer to chapter "Precautions")
4 . For other cable materials (e.g. PUR) please contact your OMRON sales representative.
5 . Material-specification for stainless steel housing case: 1.4305 (W.-No.), 303 (AISI), 2346 (SS). For other stainless steel materials please contact your OMRON sales representative.
6 . Please contact your OMRON sales representative for the availability of stainless steel BGS types.
7 . with slit E39-ES18
8 . PNP models -B4: Vcc to Vcc -2.5 V: Emitting OFF (Source current: 3 mA max.) / Open or 0 to 2.5 V: Emitting ON (Leakage current: 0.1 mA max.)
NPN models -C4: 0 to 2.5 V: Emitting OFF (Source current: 3 mA max.) / Open or Vcc to Vcc -2.5 V: Emitting ON (Leakage current: 0.1 mA max.)

Ratings / Characteristics of AC Switching Models

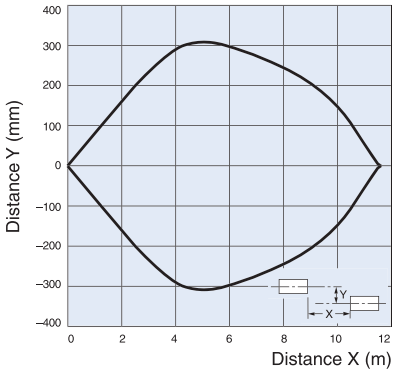
Item	E3F2-3Z1 E3F2-3Z2	E3F2-R2Z1 E3F2-R2Z2	E3F2-DS10Z1 E3F2-DS10Z2
Sensing method	Through-beam	Non-polarizing Retroreflective	Diffuse reflective (wide-beam characteristic)
Power supply voltage	24 to 240 VAC ±10 %, 50 / 60 Hz		
Current consumption	10 mA max.	5 mA max.	
Rated sensing distance[1.]	3 m	0.1 - 2 m (with reflector E39-R1)	0.1 m (5 x 5 cm white mat paper)
Typical sensing distance for different reflector types [2.]	–	E39-R1: 3,4 m E39-R7: 3,9 m E39-R8: 5,2 m	–
Detectable object	Opaque object: 11 mm min.	Opaque object: 56 mm min.	Opaque objects
Directional angle	3° to 20°		–
Differential travel	–		20 % max.
Response time	30 ms max.		
Control output	AC solid state (SCR) 200 mA max.; residual voltage: 5 V max. at 200 mA		
Power reset time	100 ms		
Ambient illumination	Incandescent lamp: 3000 lx max. Sunlight: 10000 lx max.		
Ambient temperature [5.]	Operating: -25 to 55 °C / Storage: -30 to 70 °C (with no icing or condensation)		
Ambient humidity	Operating: 35% to 85% / Storage: 35% to 95% (without condensation)		
Insulation resistance	20 M min. at 500 V DC between energized parts and case		
Dielectric strength	1500 VAC, 50 / 60 Hz for 1 min between energized parts and case		
Vibration resistance	10 to 55 Hz, 1.5 mm double amplitude for 2 hrs each direction (X, Y, Z)		
Shock resistance	500 m/sqr (approx. 50 g) for each direction (X, Y, Z)		
Enclosure rating	IP67 [3.]; NEMA 1, 2, 4; IP69k after DIN 40050 part 9		
Light source	Infrared LED (880 nm)		
Indicators	Light incident/power indicator for light source (red)		
Sensitivity adjustment	Fixed		
Connection method	2 m, 5 m pre-wired cable (PVC dia. 4 mm (14 / 0.15) [4.])		
Operation mode	Light-ON or Dark-ON (fixed)		
Circuit protection	None		
Weight (approx.)	110 g (pre-wired 2 m cable)		
Housing materials	Plastic (case: ABS; lens: PMMA)		

Note: 1 . For stable sensing distance in detail, please refer to "Engineering Data"
2 . Typical sensing distance corresponds to 80 % of the max. sensing distance.
3 . The enclosure rating IP67 of OMRON internal standards correspond to stricter test requirements than the standard IEC 60529 (refer to chapter "Precautions")
4 . For other cable materials (e.g. PUR) please contact your OMRON sales representative.

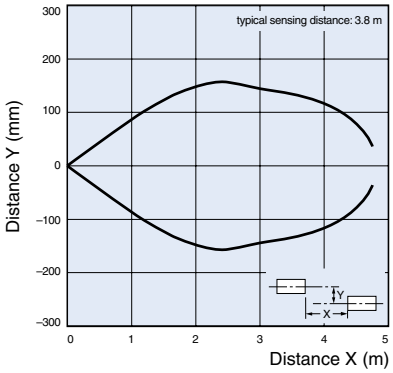
Engineering Data (Typical)

Operating Range (typical)

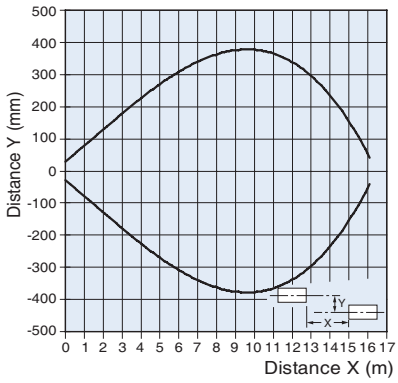
Through-beam Models (axial)
E3F2-7□4-□



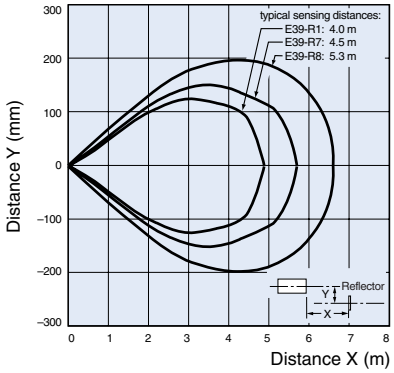
Through-beam Models (axial)
E3F2-3Z□



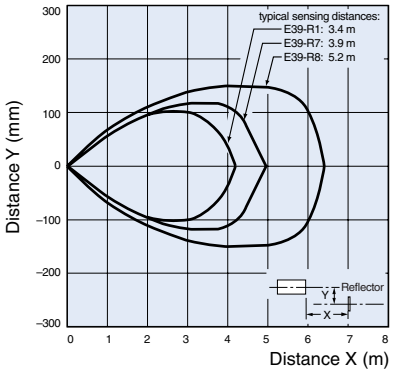
Through-beam Models (axial)
E3F2-10□



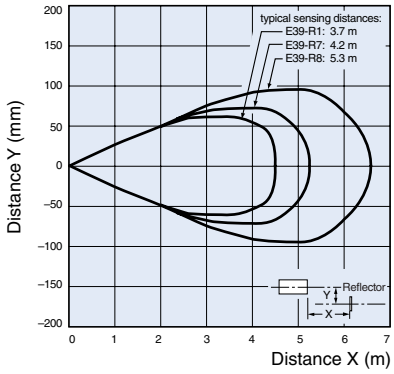
Retroreflective Models (axial)
E3F2-R2□4-□ (non polarizing)
and reflectors



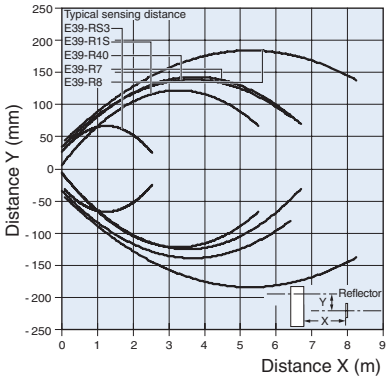
Retroreflective Models (axial)
E3F2-R2Z□ (non polarizing)
and reflectors



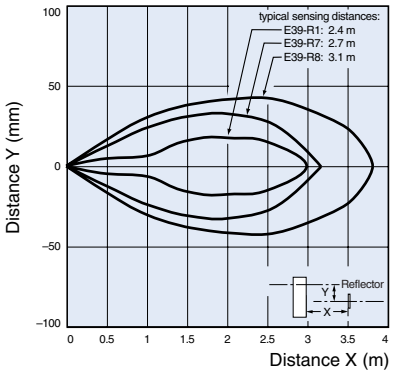
Retroreflective Models (axial)
E3F2-R2R□4-□ (polarizing)
and reflectors



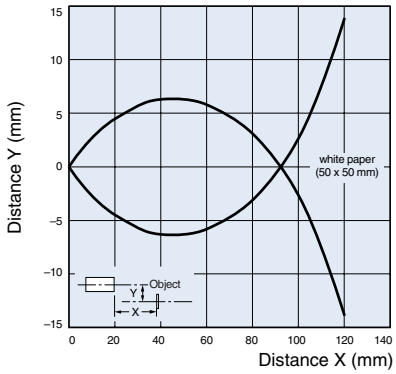
Retro-reflective Models (axial)
E3F2-R4□4□-□ (polarizing)



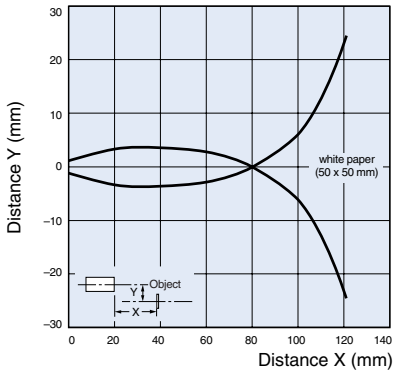
Retroreflective Models (radial)
E3F2-R2R□41-□ (polarizing)
and reflectors



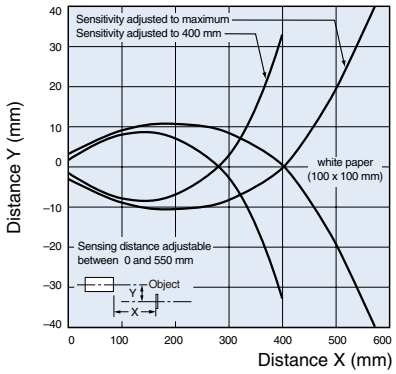
Diffuse reflective Models (axial)
E3F2-DS10□4-□ (wide-beam type)



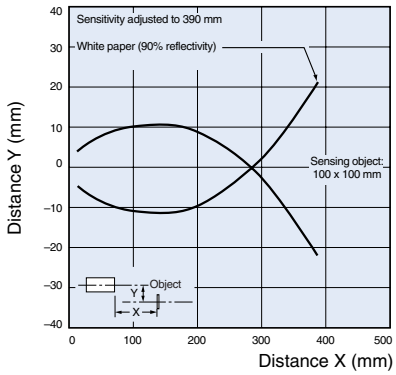
Diffuse reflective Models (axial)
E3F2-DS10Z-□ (wide-beam type)



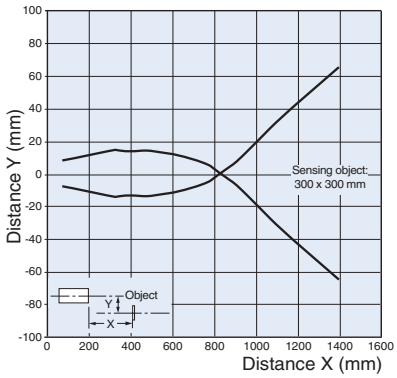
Diffuse reflective Models (axial)
E3F2-DS30□4-□



Diffuse reflective Models (radial)
E3F2-DS30□41-□

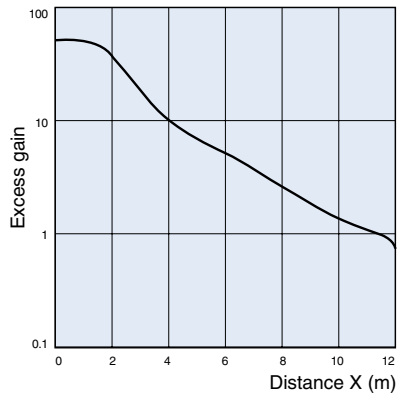


Diffuse reflective Models (axial)
E3F2-D1□4-□

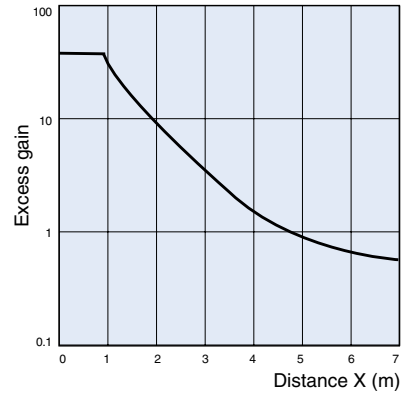


Excess Gain Ratio vs. Distance (typical)

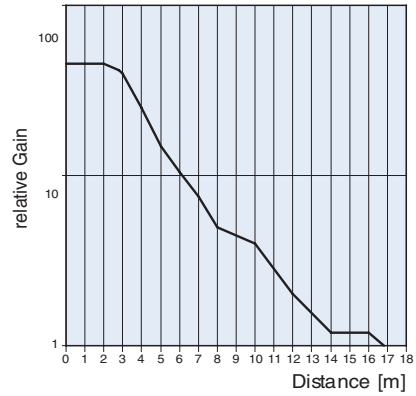
Through-beam Models (axial)
E3F2-7□4-□



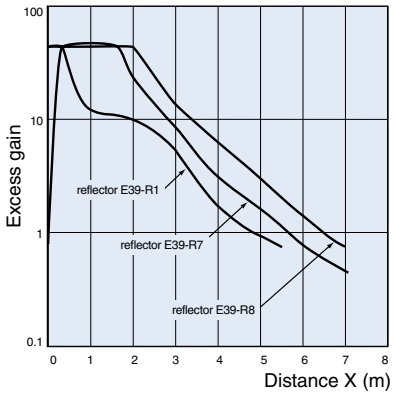
Through-beam Models (axial)
E3F2-3Z□



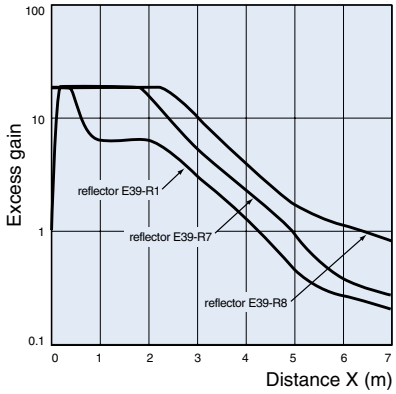
Through-beam Models (axial)
E3F2-10□



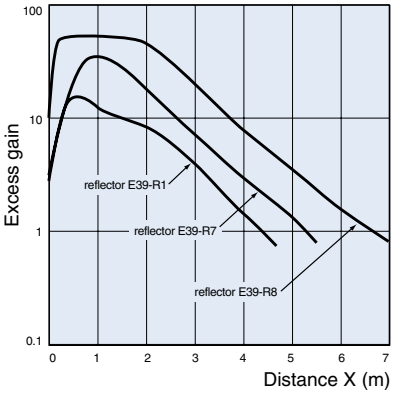
Retroreflective Models (axial)
E3F2-R2□4-□ (non polarizing)
and reflectors



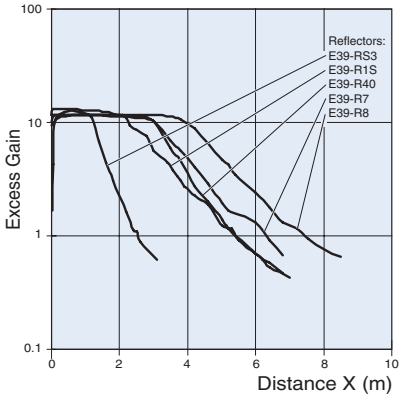
Retroreflective Models (axial)
E3F2-R2Z□ (non polarizing)
and reflectors



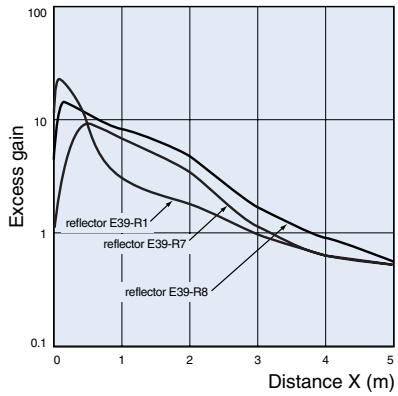
Retroreflective Models (axial)
E3F2-R2R□4-□ (polarizing)
and reflectors



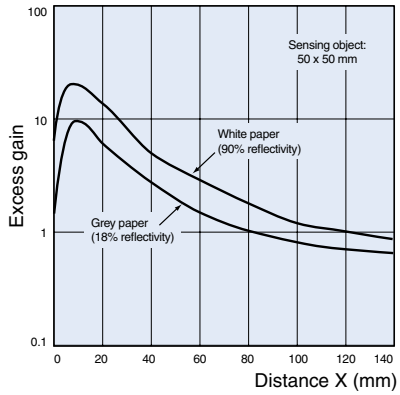
Retroreflective Models (axial)
E3F2-R4□4□-□



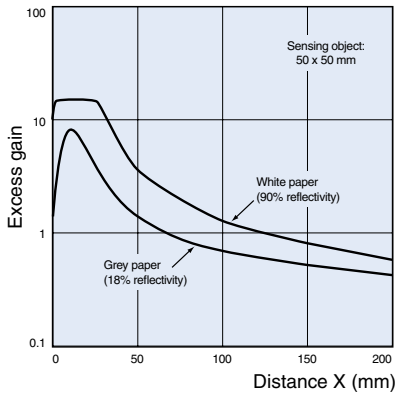
Retroreflective Models (radial)
E3F2-R2R□41-□ (polarizing)
and reflectors



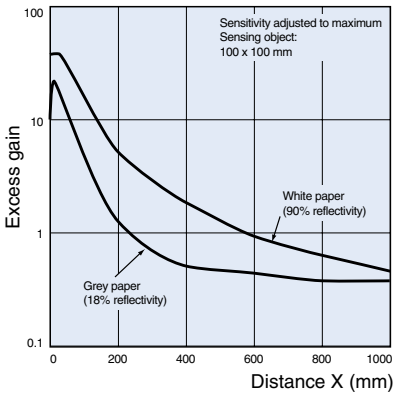
Diffuse reflective Models (axial)
E3F2-DS10□4-□ (wide-beam type)



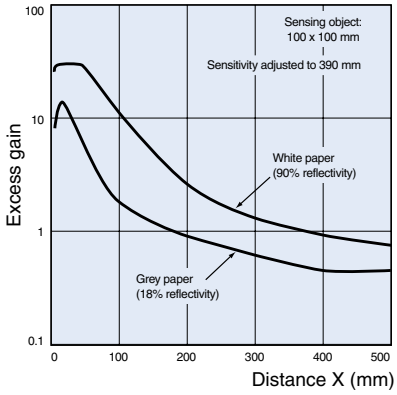
Diffuse reflective Models (axial)
E3F2-DS10Z-□ (wide-beam type)



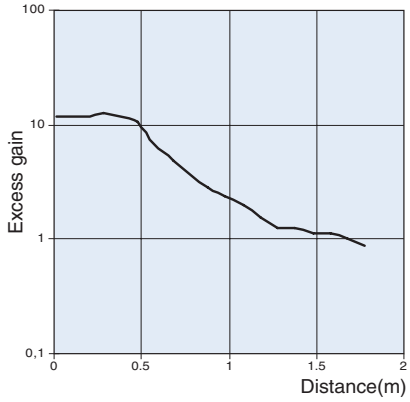
Diffuse reflective Models (axial)
E3F2-DS30□4-□



Diffuse reflective Models (radial)
E3F2-DS30□41-□

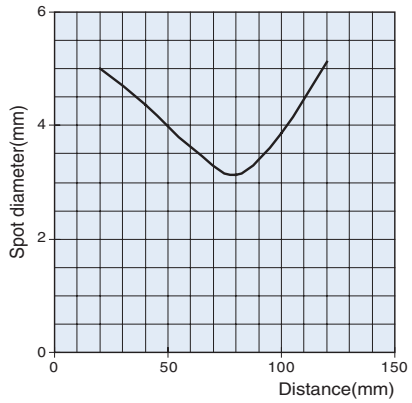


Diffuse reflective Models (axial)
E3F2-D1□4-□



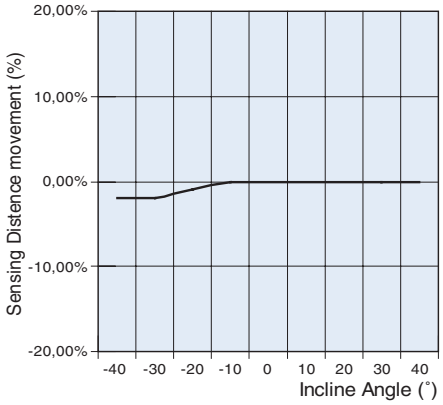
Light spot vs sensing distance

Background suppression Models
E3F2-LS□



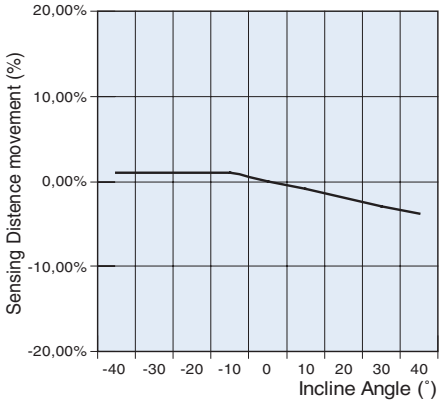
Incline (left and right)

Background suppression Models
E3F2-LS□



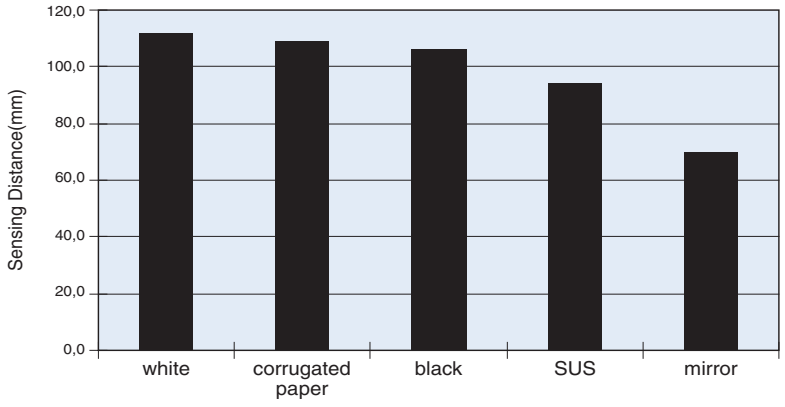
Incline (up and down)

Background suppression Models
E3F2-LS□



Object material vs sensing distance

Background suppression Models
E3F2-LS□

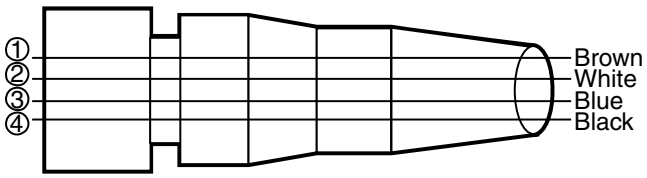


Operation

Output Circuits

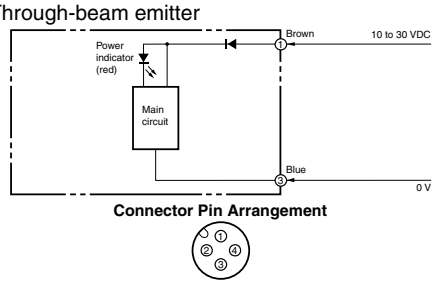
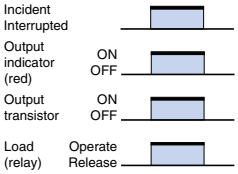
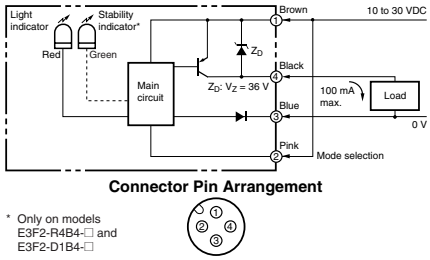
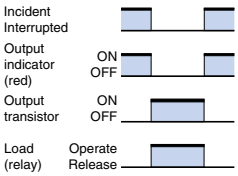
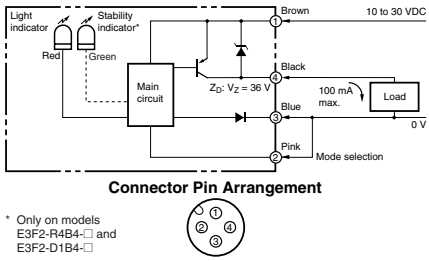
Structure of Sensor I/O Connector

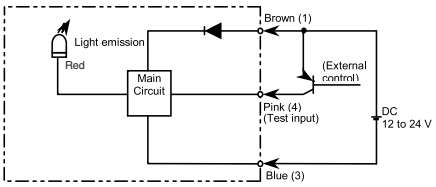
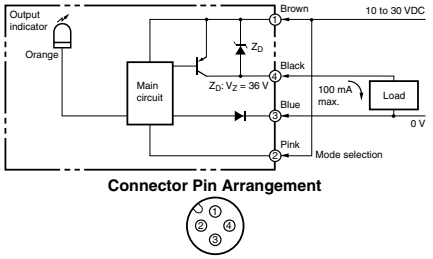
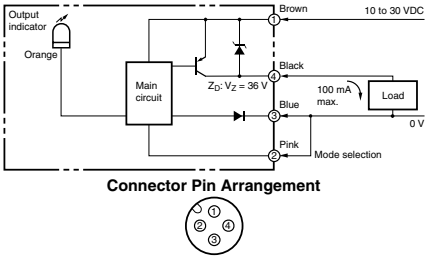
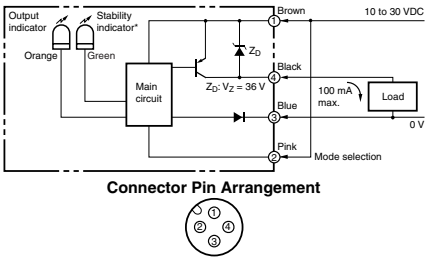
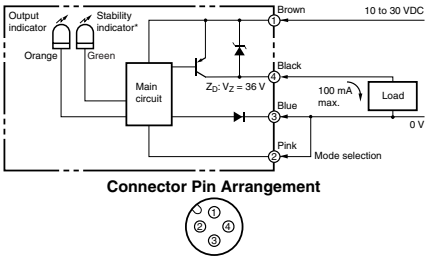
Classification	Wire color	Connector pin No.	Use
DC	Brown	①	Power supply (+V)
	White	②	Mode selection Lon/Don
	Blue	③	Power supply (0 V)
	Black	④	Output



XS2F-D42□-D80-□
XS2F-G42□-G80-□

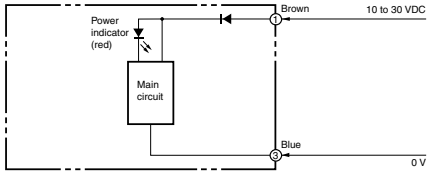
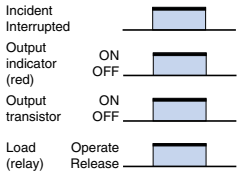
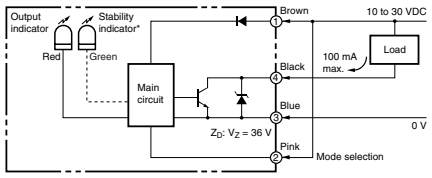
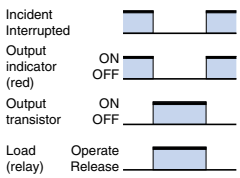
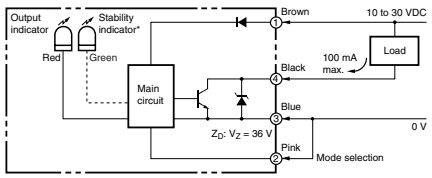
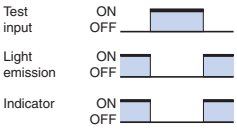
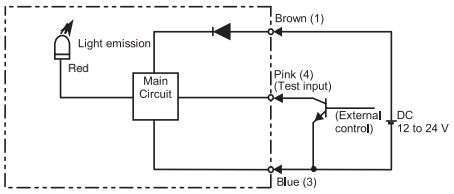
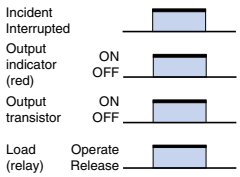
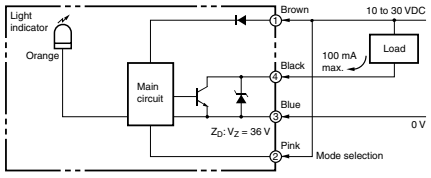
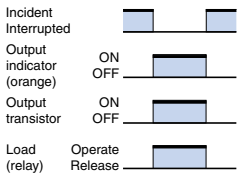
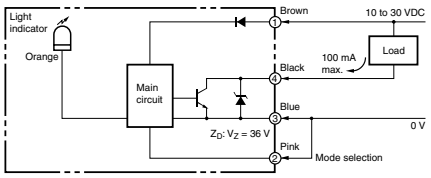
PNP Output

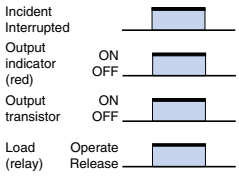
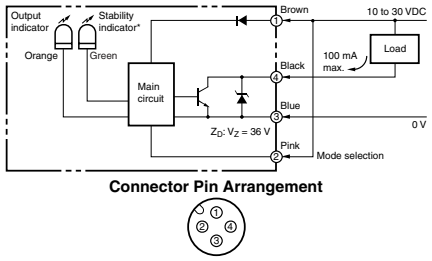
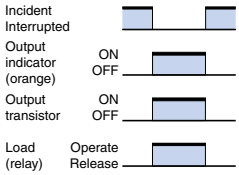
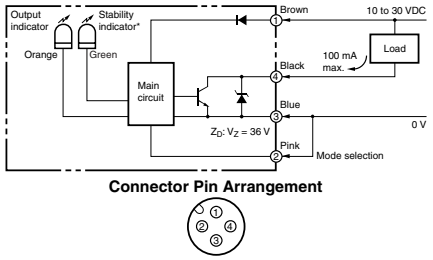
Model	Output transistor status	Timing chart	Connection method	Output circuit
E3F2-□B4-□ (except for E3F2-10B4-□ and E3F2-LS10B4-□)	–	–	–	Through-beam emitter 
	ON when light is incident. (Light-ON)		Connect the pink (Pin ②) and brown (Pin ①) cords or open the pink cord (Pin ②).	
	ON when light is interrupted. (Dark-ON)		Connect the pink (Pin ②) and blue (Pin ③) cords.	

Model	Output transistor status	Timing chart	Connection method	Output circuit
E3F2-10B4-□	–	Test input ON OFF Light emission ON OFF Indicator ON OFF	–	Through-beam emitter 
	ON when light is incident. (Light-ON)	Incident Interrupted Output indicator (orange) ON OFF Output transistor ON OFF Load (relay) Operate Release	Connect the pink (Pin ②) and brown (Pin ①) cords or open the pink cord (Pin ②).	 **Connector Pin Arrangement**
	ON when light is interrupted. (Dark-ON)	Incident Interrupted Output indicator (orange) ON OFF Output transistor ON OFF Load (relay) Operate Release	Connect the pink (Pin ②) and blue (Pin ③) cords.	 **Connector Pin Arrangement**
E3F2-LS10B4-□	ON when light is incident. (Light-ON)	Incident Interrupted Output indicator (orange) ON OFF Output transistor ON OFF Load (relay) Operate Release	Connect the pink (Pin ②) and brown (Pin ①) cords or open the pink cord (Pin ②).	 **Connector Pin Arrangement**
	ON when light is interrupted. (Dark-ON)	Incident Interrupted Output indicator (orange) ON OFF Output transistor ON OFF Load (relay) Operate Release	Connect the pink (Pin ②) and blue (Pin ③) cords.	 **Connector Pin Arrangement**

Note: Terminal numbers for connector type.

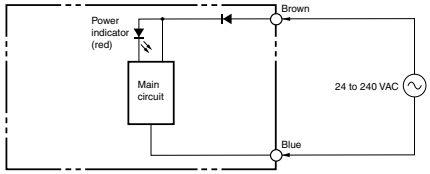
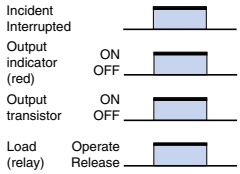
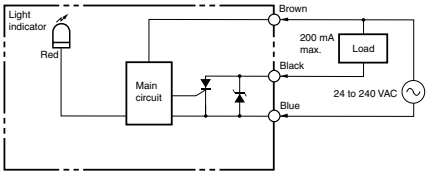
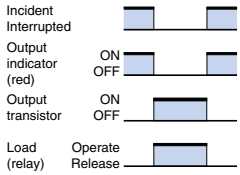
NPN Output

Model	Output transistor status	Timing chart	Connection method	Output circuit
E3F2-□C4-□ (except for E3F2-10C4-□ and E3F2-LS10C4-□)	–		–	Through-beam emitter  **Connector Pin Arrangement** 
	ON when light is incident. (Light-ON)	 	Connect the pink (Pin ②) and brown (Pin ①) cords or open the pink cord (Pin ②).	 **Connector Pin Arrangement** * Only on models E3F2-R4C4-□ and E3F2-D1C4-□ 
	ON when light is interrupted. (Dark-ON)	 	Connect the pink (Pin ②) and blue (Pin ③) cords.	 **Connector Pin Arrangement** * Only on models E3F2-R4C4-□ and E3F2-D1C4-□ 
E3F2-10C4-□	–	 	–	Through-beam emitter 
	ON when light is incident. (Light-ON)	 	Connect the pink (Pin ②) and brown (Pin ①) cords or open the pink cord (Pin ②).	 **Connector Pin Arrangement** 
	ON when light is interrupted. (Dark-ON)	 	Connect the pink (Pin ②) and blue (Pin ③) cords.	 **Connector Pin Arrangement** 

Model	Output transistor status	Timing chart	Connection method	Output circuit
E3F2-LS10C4-□	ON when light is incident. (Light-ON)		Connect the pink (Pin ②) and brown (Pin ①) cords or open the pink cord (Pin ②).	
	ON when light is interrupted. (Dark-ON)		Connect the pink (Pin ②) and blue (Pin ③) cords.	

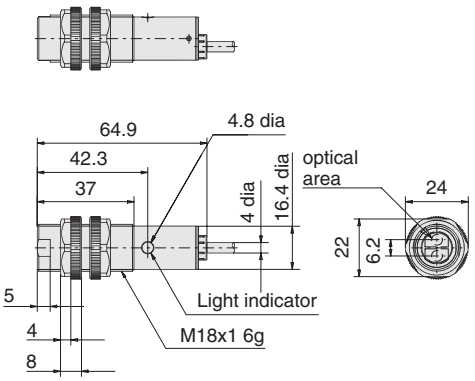
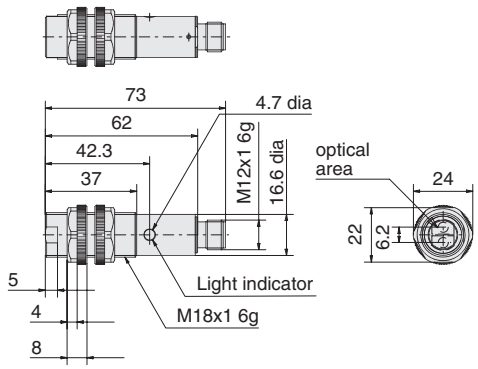
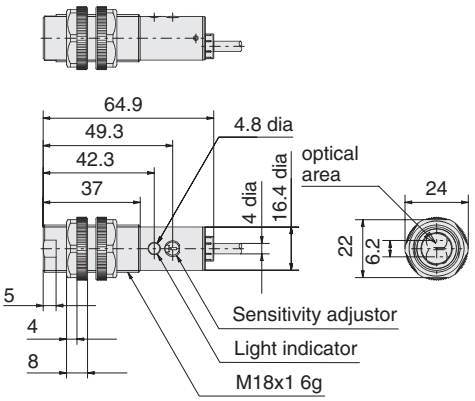
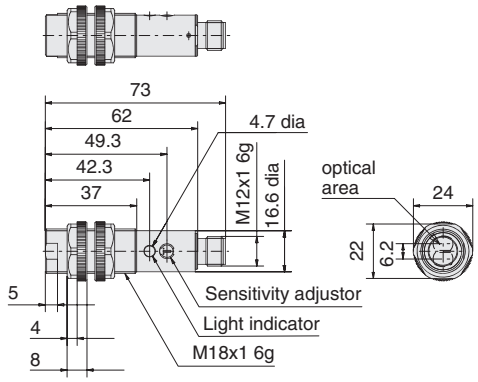
Note: Terminal numbers for connector type.

AC Output

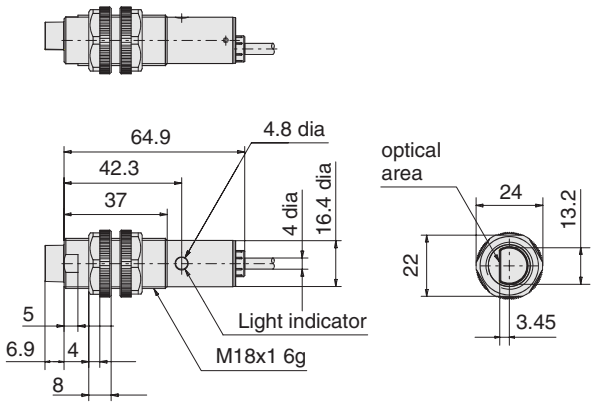
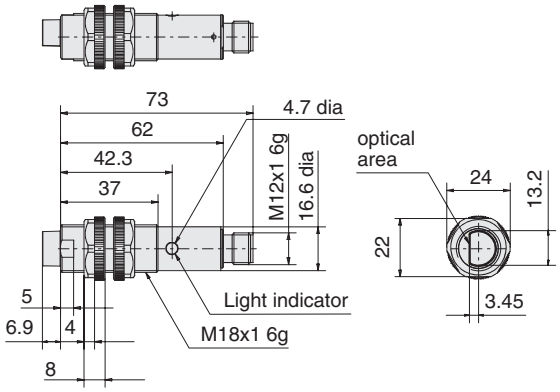
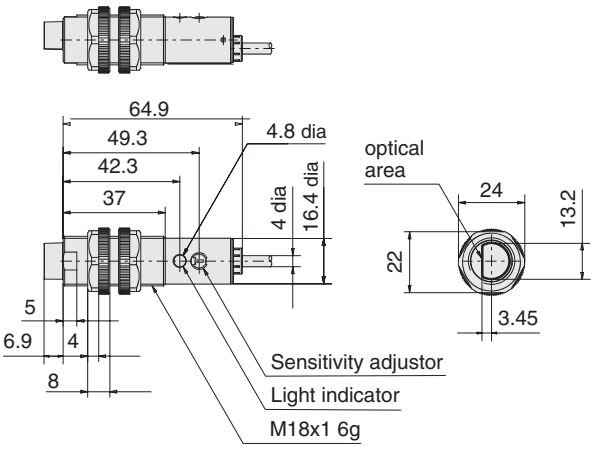
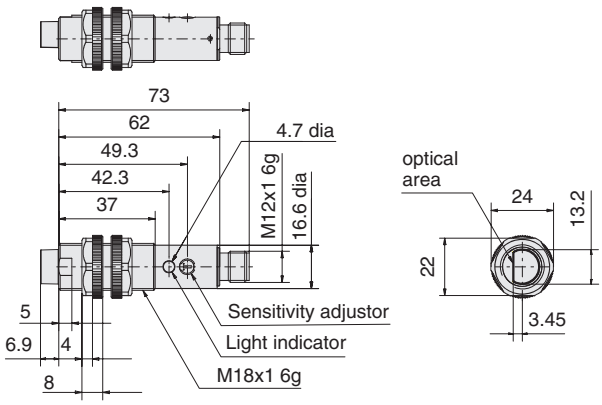
Model	Output transistor status	Timing chart	Connection method	Output circuit
E3F2-3LZ	–	–	–	Through-beam emitter 
E3F2-3Z1 E3F2-R2Z1 E3F2-DS10Z1-N	ON when light is incident. (Light-ON)		–	
E3F2-3Z2 E3F2-R2Z2 E3F2-DS10Z2-N	ON when light is interrupted. (Dark-ON)		–	

Dimensions Note: All units are in millimeters unless otherwise indicated

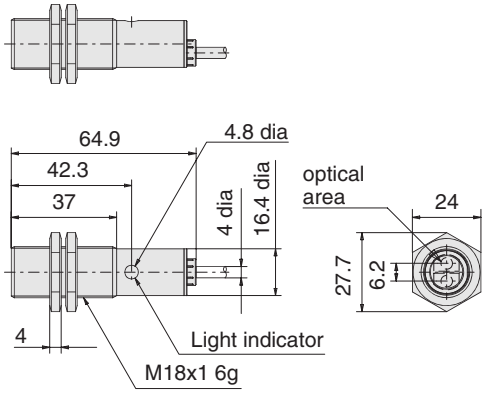
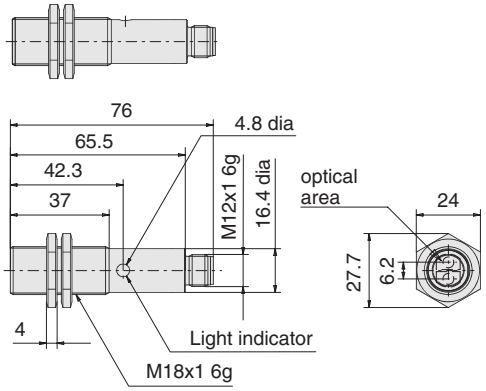
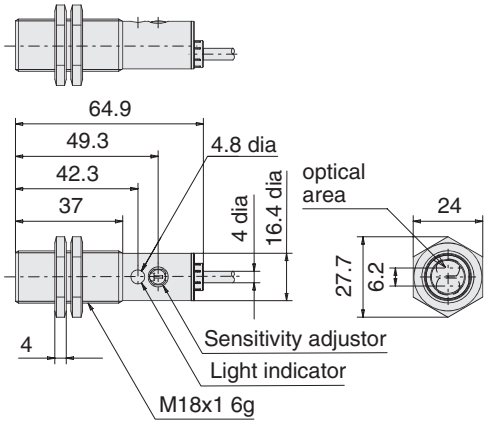
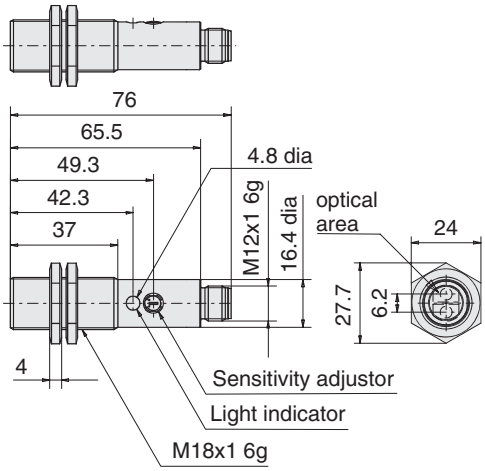
DC-Switching Models, plastic, axial type

Cable type	Connector type
Without potentiometer	
E3F2-7□ **E3F2-10□** **E3F2-R2□4** **E3F2-DS10□4-N** **E3F2-LS10□4** **E3F2-R4□4F** 	**E3F2-7□-P1** **E3F2-10□ –P1** **E3F2-R2□4-P1** **E3F2-DS10□4-P1** **E3F2-LS10□4-P1** **E3F2-R4□4F-P1** 
With potentiometer	
E3F2-DS30□4 **E3F2-D1□4** 	**E3F2-DS30□4-P1** **E3F2-D1□4-P1** 

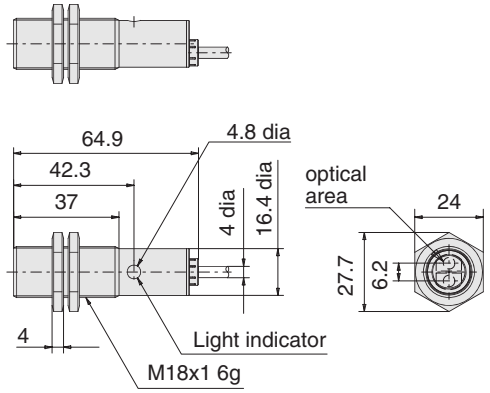
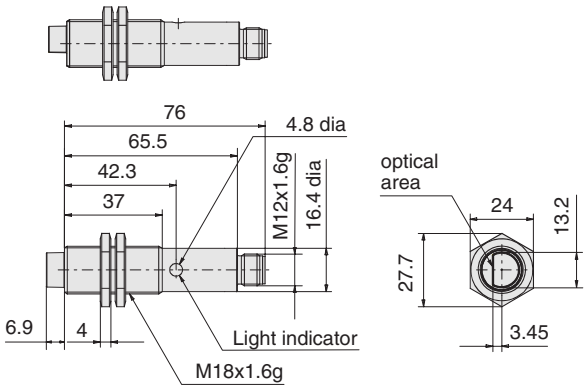
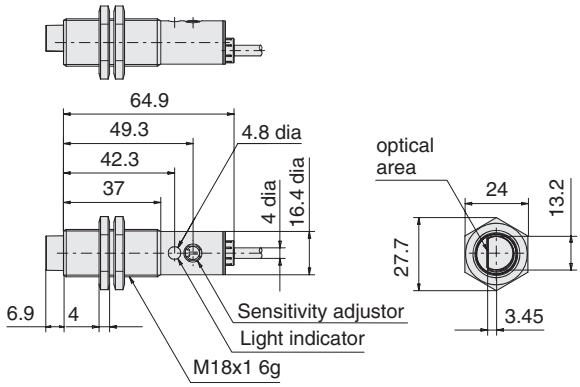
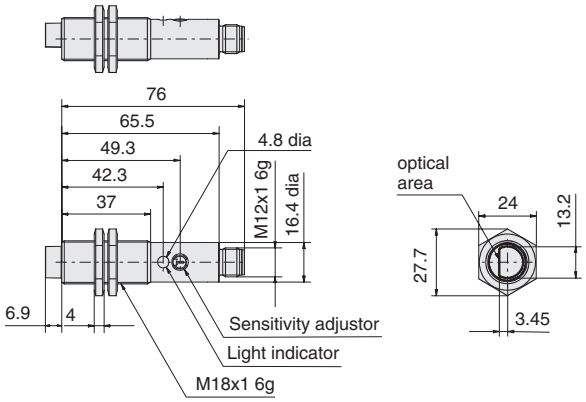
DC-Switching Models, plastic, radial type

Cable type	Connector type
Without potentiometer	
E3F2-R2R□41 	**E3F2-R2R□41-P1** 
With potentiometer	
E3F2-DS30□41 	**E3F2-DS30□41-P1** 

DC-Switching Models, metal (brass and stainless steel), axial type

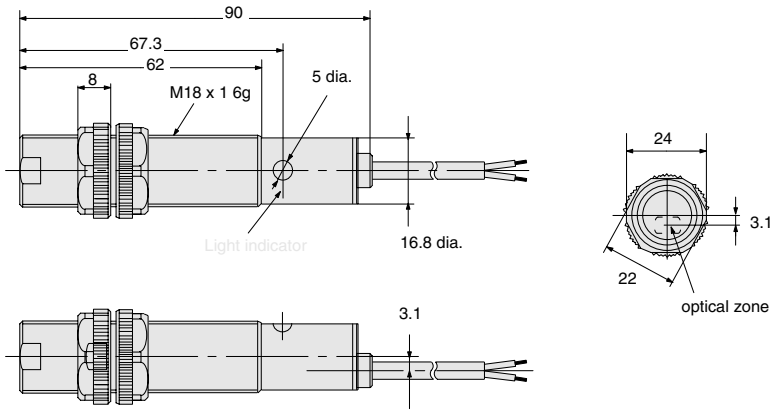
Cable type	Connector type
Without potentiometer	
E3F2-7□-M **E3F2-7□-S** **E3F2-10□-M** **E3F2-R2R□4-M** **E3F2-R2R□4-S** **E3F2-DS10□4-M** **E3F2-DS10□4-S** **E3F2-LS10□4-M** **E3F2-R4□4F-M**	**E3F2-7□-M1-M** **E3F2-7□-M1-S** **E3F2-10□-M1-M** **E3F2-R2R□4-M1-M** **E3F2-R2R□4-M1-S** **E3F2-DS10□4-M1-M** **E3F2-DS10□4-M1-S** **E3F2-LS10□4-M1-M** **E3F2-R4□4F-M1-M**
	
With potentiometer	
E3F2-DS30□4-M **E3F2-DS30□4-S** **E3F2-R4□4-M** **E3F2-D1□4-M**	**E3F2-DS30□4-M1-M** **E3F2-DS30□4-M1-S** **E3F2-R4□4-M1-M** **E3F2-D1□4-M1-M**
	

DC-Switching Models, metal (brass and stainless steel), radial type

Cable type	Connector type
Without potentiometer	
E3F2-R2R□41-M E3F2-R2R□41-S	**E3F2-R2R□41-M1 E3F2-R2R□41-M1-S**
	
With potentiometer	
E3F2-DS30□41-M E3F2-DS30□41-S	**E3F2-DS30□41-M1-M E3F2-DS30□41-M1-S**
	

AC-Switching Models, plastic, axial type

Cable type
Without potentiometer
E3F2-3Z□ **E3F2-R2Z□** **E3F2-DS10Z□-N**

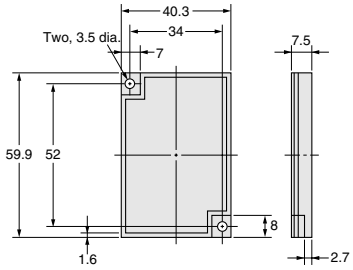


Accessories (Order Separately)

Reflectors

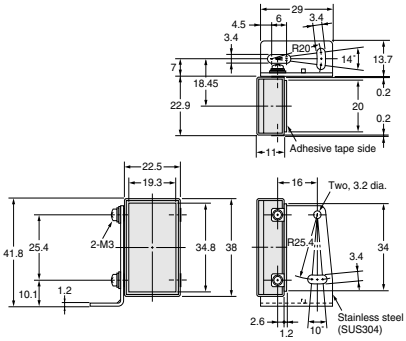
E39-R1
E39-R1S

Material, reflective surface: acrylic
Rear surface: ABS

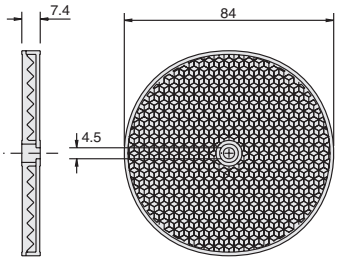


E39-R3

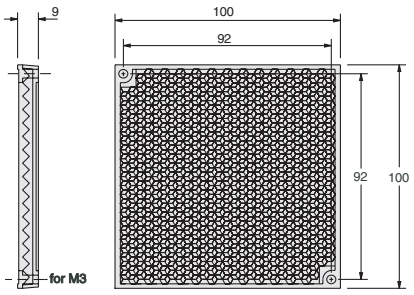
Material, reflective surface: acrylic
Rear surface: ABS



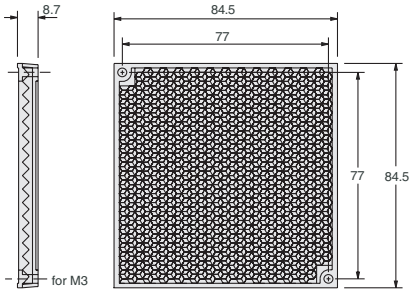
E39-R7



E39-R8

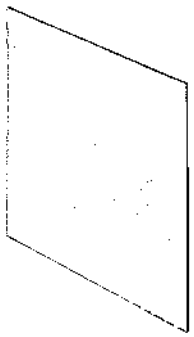


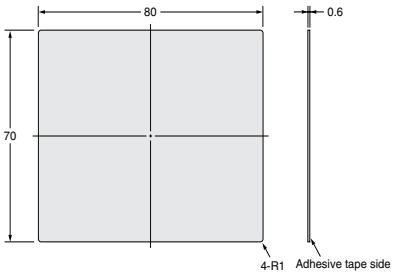
E39-R40



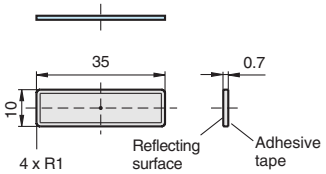
Tape Reflectors

E39-RS3

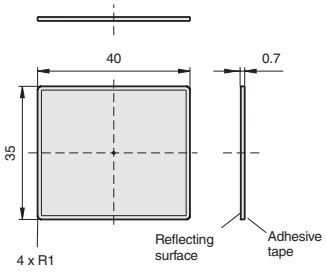




E39-RS1

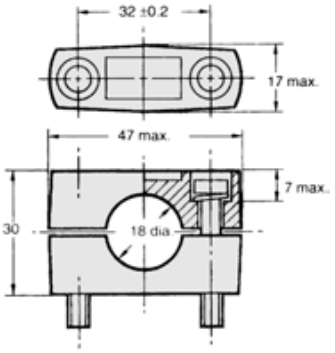


E39-RS2



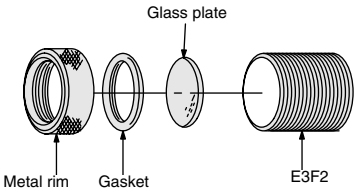
Installation

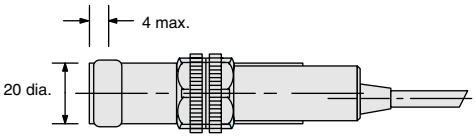
Mounting Bracket
Y92E-B18



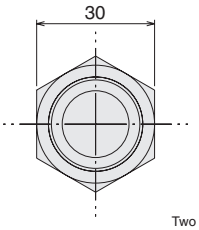
Note:
Hexagon bolt: M5 x 32
Material: plastic

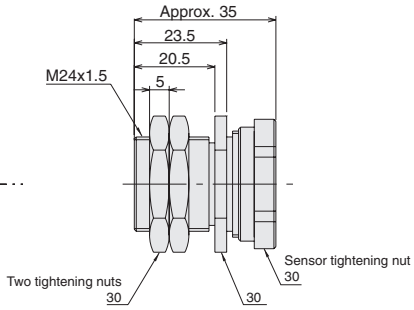
Lens Cap
E39-F31



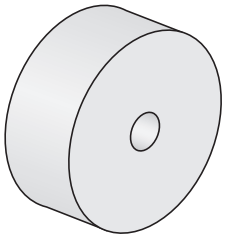


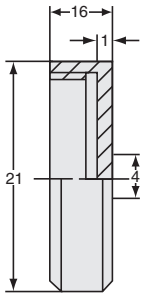
Mounting Bracket
Y92E-G18





Slit (for precision detection with E3F2-10□)
E39-ES18





Precautions

The E3F2 Photoelectric Sensor is not a safety component for ensuring the safety of people which is defined in EC directive (91/368/EEC) and covered by separate European standards or by any other regulations or standards.

Degree of protection

The E3F2 photoelectric sensors have a degree of protection rated with IP67. In this case, the sensors have passed the OMRON heat shock test before the IP67-test of IEC 60529 (submersion at 1m water depth for 30 min). Afterwards the sensors have been tested according to the OMRON waterproof test.

Heat shock: Alternating, fast temperature changes between -25°C and +55°C are executed for 5 cycles and 1 hour for each temperature. Function and isolation are checked.

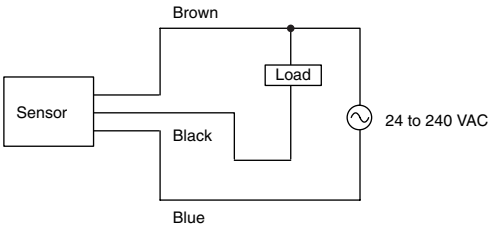
Water proof: The sensors are submerged alternating in water of +2°C and +55°C. 20 cycles with 1 hour for each temperature are executed. Function, water tightness and electrical isolation are checked.

Do not expose the photoelectric sensor to excessive shock during installation, keeping within IP 67 standards.

Wiring

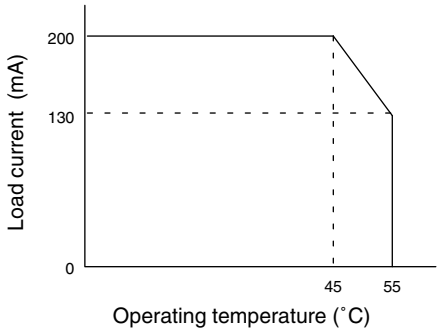
If the input/output lines of the photoelectric sensor are placed in the same conduit or duct as power lines or high-voltage lines, the photoelectric sensor could be induced to malfunction, or even be damaged by electrical noise. Separate the wiring, or use shielded lines as input/output lines to the photoelectric sensor.

Do not connect the black wire to the brown wire without a load. Direct connection of these wires may damage the photoelectric sensor (AC switching type).



When using the photoelectric sensor in the vicinity of an inverter motor, ensure to connect the protective earth ground wire of the motor to earth. Failure to ground the motor may result in malfunction of the sensor.

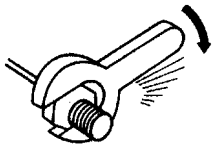
When you use the photoelectric sensor at temperatures exceeding 45°C, the load current must be within the described values as shown in the figure below.



Installation

Do not exceed a torque of

- 2.0 Nm (20 kgf cm) when tightening mounting nuts for plastic models
- 20.0 Nm (200 kgf cm) when tightening mounting nuts for metal models



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

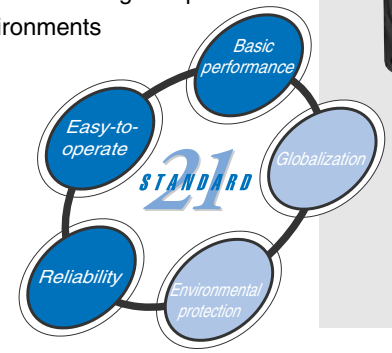
Cat. No. E224-E2-03

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

General purpose sensors in compact plastic housing

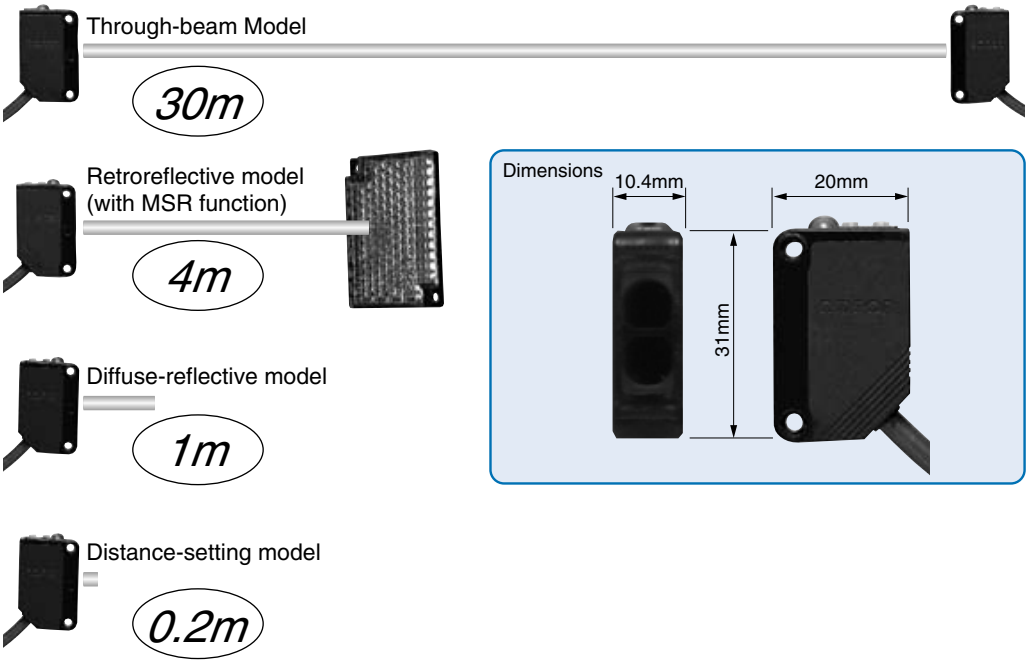
E3Z

- Compact housing size and high power LED for excellent performance-size ratio
- IP67 and IP69k for highest protection in wet environments



Features

Basic performance

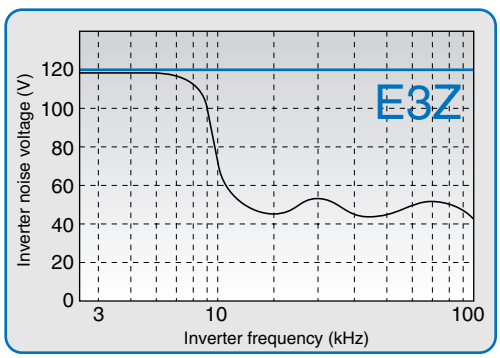


Reliability

Eliminates the influence of installation and on-site conditions, thus increasing the reliability of the line.

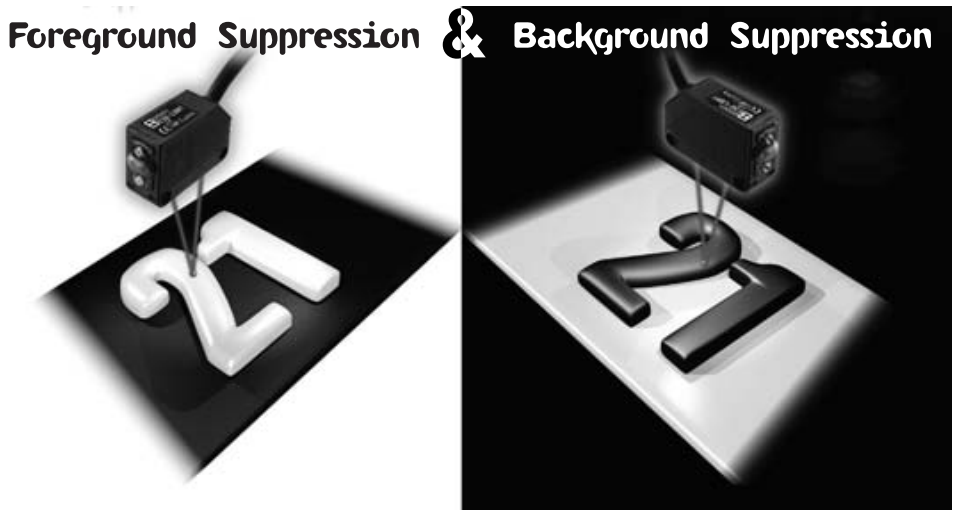
High protection against water and dust contaminants

High immunity to electrical interference, such as inverter drives.



Stability

E3Z-series reliability covers a wide range of object/background combinations, so ensuring stable detection regardless of workpiece color or reflectivity.

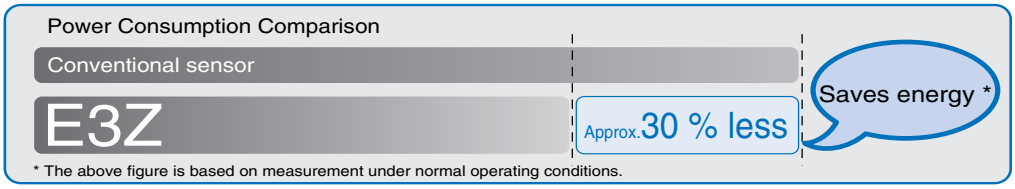


Environmental protection

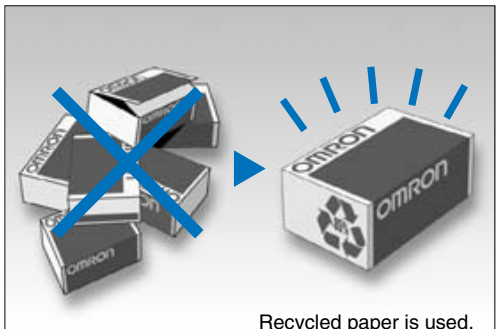
Photoelectric Sensor with Built-in Amplifier

This ECO label is indicated on products that meet the environmental standards established by OMRON.

E3Z is environmental-friendly, energy-saving.



10-quantity packing reduces waste cartons.

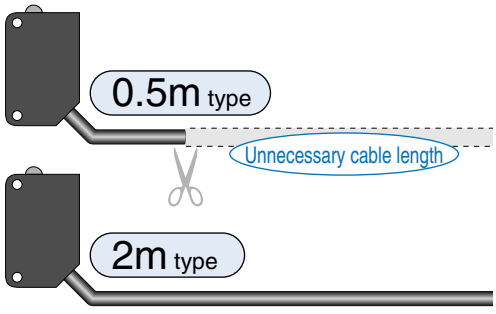


Recycled paper is used.

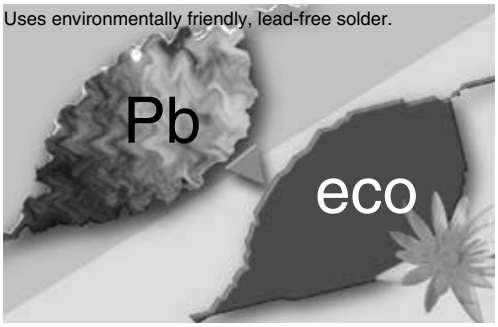
Packed in "combustible" polyethylene bags free of Styrofoam. *

* If this bag is burned, dioxins hazardous to humans are minimal.

Standard models provided with a 0.5-m cable are available for the elimination of unnecessary cable length.



On-going elimination of materials containing lead.



Narrow Beam model

Ideal for detecting small objects with a small spot:

- Tiny objects as little as 0.1 mm in diameter can be detected with its 2.5-mm dia. spot.
- The thin beam enables detection through gaps or small holes.
- The high-intensity spot of light enables visual alignment of sensing spot position.

Transparent PET bottles

Stable detection of recyclable thin-wall PET bottles.

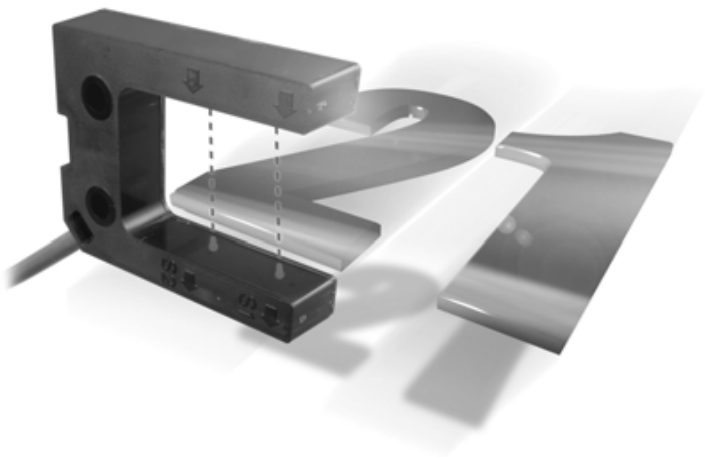
Standard-size transparent object sensor

- Uses OMRON's unique optical system ("Inner View") that can detect various shapes of PET bottles and transparent objects.
- Detects a wide range of bottles regardless of size and facets

Fork Sensor, single and dual beam versions

Fork design eliminates the need for optical axis adjustment.

- Two-axis models also available.
- Ideal for limit of travel monitoring.
- Condition monitoring.
- „Flag“ identification.



Applications

E3Z-LS background and foreground suppression models

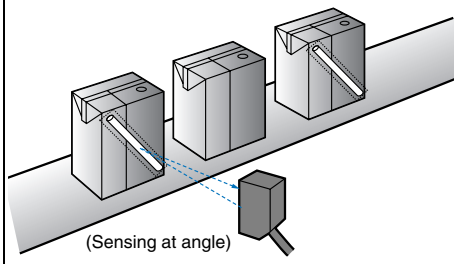
Detecting covers on cosmetic products

Detecting pastries on conveyor belts

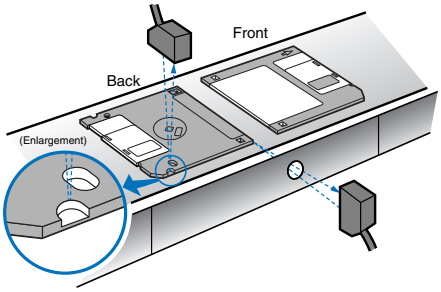
Detecting packaged chewing gum or candy

E3Z-L narrow beam models

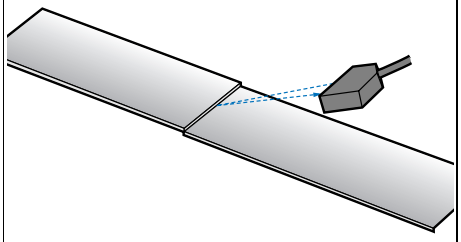
Checking for straws



Determining front/back or orientation of floppy disks

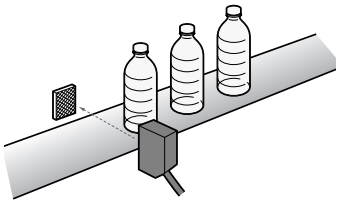


Detecting uneven joints

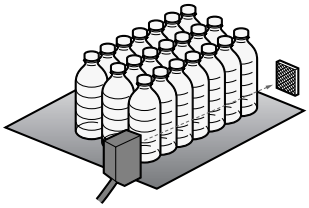


E3Z-B transparent object model

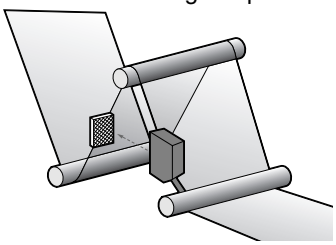
Transparent PET Bottle-related Detection - One bottle



Transparent PET Bottle related Detection - Multiple bottles (Stocker)

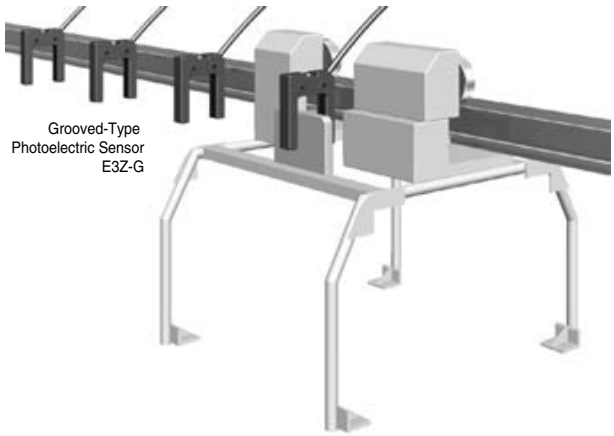


Detection of films and glass plates



E3Z-G grooved type model

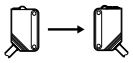
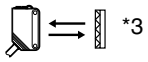
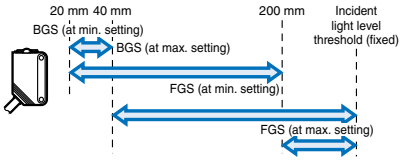
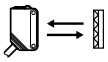
Crane and automated warehouse conveyor table passage inspection and positioning.



Ordering Information

Sensors

Red light Infrared light

Sensor type	Shape	Connection method	Sensing distance	Model NPN output	Model PNP output
Through-beam		Pre-wired models (2 m)*1	30m	E3Z-T62	E3Z-T82
				E3Z-T62-G0*2	E3Z-T82-G0
		Connector type		E3Z-T67	E3Z-T87
				E3Z-T67-G0	E3Z-T87-G0
		Pre-wired models (2 m)*1	15m	E3Z-T61	E3Z-T81
		Connector type		E3Z-T66	E3Z-T86
		Pre-wired models (2 m)*1	10m	E3Z-T61A	E3Z-T81A
		Connector type		E3Z-T66A	E3Z-T86A
Retroreflective model (with M.S.R. function)	 *3	Pre-wired (2 m)*1	4m [100mm] *4	E3Z-R61	E3Z-R81
		Connector type		E3Z-R66	E3Z-R86
Diffuse-reflective		Pre-wired models (2 m)*1	5 to 100 mm (wide view)	E3Z-D61	E3Z-D81
		Connector type		E3Z-D66	E3Z-D86
		Pre-wired models (2 m)*1, *5	1m	E3Z-D62	E3Z-D82
		Connector type		E3Z-D67	E3Z-D87
Thin beam type reflective model		Pre-wired models (2 m)*1	90±30mm	E3Z-L61	E3Z-L81
		Connector type		E3Z-L66	E3Z-L86
Distance-settable		Pre-wired models (2 m)*1		E3Z-LS61	E3Z-LS81
		Connector type		E3Z-LS66	E3Z-LS86
Transparent PET bottle type Retro- reflective model (without M.S.R. function)	 *3	Pre-wired (2 m)*1	500mm [80mm] *4	E3Z-B61	E3Z-B81
		Connector type		E3Z-B66	E3Z-B86
		Pre-wired models (2 m)*1	2m [100mm] *4	E3Z-B62	E3Z-B82
		Connector type		E3Z-B67	E3Z-B87
Grooved type through-beam model	 1 2 1 2	Pre-wired models (2 m)*1	25mm	E3Z-G61	E3Z-G81
				E3Z-G62	E3Z-G82
		Junction connector		E3Z-G61-M3J	E3Z-G81-M3J
				E3Z-G62-M3J	E3Z-G82-M3J

*1. Models provided with a 0.5-m cable are available. When ordering, specify the cable length by adding the code "0.5M" to the model number (e.g., E3Z-T61 0.5M).
*2. With „Emission Stop“ feature. Can be used to force a state change at the receiver (Sensor function test).
*3. Not attached. Please purchase the optional reflector (9 types) according to your application.
*4. The sensing distance specified is possible when the E39-R1S used. Figure in parentheses indicate the minimum required distance between the Sensor and Reflector.
*5. The connector joint type is available M12. Its model ends with -M1. (Example: E3Z-T61-M1J)

Accessories (Order Separately)

Slits

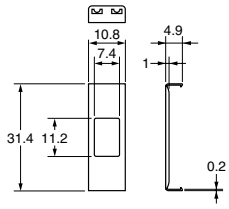
Slit width	Sensing distance (typical) E3Z-T□□	Sensing distance (typical) E3Z-T□□A	Minimum sensing object (typical)	Model	Quantity
0.5 mm dia.	50 mm	35 mm	0.2 mm dia.	E39-S65A	One set (contains slits for both the emitter and receiver)
1-mm dia.	200 mm	150 mm	0.4 mm dia.	E39-S65B	
2-mm dia.	800 mm	550 mm	0.7 mm dia.	E39-S65C	
0.5 x 10 mm	1 m	700 mm	0.2 mm dia.	E39-S65D	
1 x 10 mm	2.2 m	1.5 m	0.5 mm dia.	E39-S65E	
2 x 10 mm	5 m	3.5 m	0.8 mm dia.	E39-S65F	

Reflectors
Not provided with retroreflective models

Name	Sensing distance (typical) *	Model	Quantity	Remarks
Reflectors	3 m [100 mm] (Rated value)	E39-R1	1	
	4 m [100 mm] (Rated value)	E39-R1S	1	
	500 mm [80 mm]	E39-R1S	1	for E3Z-B□1/6
	2 m [100 mm]			for E3Z-B□2/7
	5 m [100 mm]	E39-R2	1	
	2.5 m [100 mm]	E39-R9	1	
	3.5 m [100 mm]	E39-R10	1	
Fog preventing	500 mm [80 mm]	E39-R1K	1	for E3Z-B□1/6
	2 m [100 mm]			for E3Z-B□2/7
Small reflector	1.5 m [50 mm]	E39-R3	1	
Tape Reflector	700 mm [150 mm]	E39-RS1	1	
	1.1 m [150 mm]	E39-RS2	1	
	1.4 m [150 mm]	E39-RS3	1	

* Values in parentheses indicate the minimum required distance between the sensor and reflector.
Note: 1 . When using the reflector of other than the rated value, set the sensing distance to about 0.7 times of the typical example as a guideline.
2 . For details, refer to the "Reflector list".

Mutual interference prevention filter

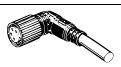
Sensing distance	Shape/dimensions	Model	Quantity	Remarks
3 m		E39-E11	2 sets each for emitters and receivers (total of 4 pcs.)	Can be used with the through-beam E3Z-T□□A. The arrow represents the polarizing direction. Changing the polarizing direction of the two adjacent emitters and receivers prevents mutual interference.

Mounting Brackets

Shape	Model	Quantity	Remarks	Shape	Model	Quantity	Remarks
	E39-L153	1	Mounting Brackets		E39-L150	One set	Sensor adjuster Easy mounting to aluminum frame/rail of conveyor or like, easy adjustment. For left-to-right adjustment
	E39-L104	1					
	9-L43	1	Horizontal type mounting bracket		E39-L151	One set	
	E39-L142	1	Horizontal type protective cover bracket		E39-L93□	One set	Sensor adjuster Easy mounting to aluminum frame/rail of conveyor or like, easy adjustment. For vertical angle adjustment
	E39-L44	1	Rear mounting bracket				
	E39-L98	1	Protective cover bracket		E39-L144	1	Vertical protective cover bracket

Note: 1 . If a through-beam model is used, order two Mounting Brackets for the emitter and receiver respectively.
2 . For details, refer to the "Mounting bracket list".

Sensor I/O Connectors

Size	Cable type	Shape	Cable length		Model
M8	Standard cable	Straight 	2 m	4-wire type	XS3F-M421-402-A
			5 m		XS3F-M421-405-A
		L-shaped 	2 m		XS3F-M422-402-A
			5 m		XS3F-M422-405-A
M12 (for -M1J)		Straight 	2 m	3-wire type	XS2F-D421-DC0-A
			5 m		XS2F-D421-GC0-A
		L-shaped 	2 m		XS2F-D422-DC0-A
			5 m		XS2F-D422-GC0-A

Rating/performance

Sensor type		Through-beam			Retroreflective model (with M.S.R. function)	Diffuse-reflective	
						wide-beam	standard-beam
Model	NPN output	E3Z-T62/T67	E3Z-T61/T66	E3Z-T61A/T66A	E3Z-R61/R66	E3Z-D61/D66	E3Z-D62/D67
Item	PNP output	E3Z-T82/T87	E3Z-T81/T86	E3Z-T81A/T86A	E3Z-R81/R86	E3Z-D81/D86	E3Z-D82/D87
Sensing distance		30 m	15 m	10 m	4 m (100 mm) * (When using the E39-R1S) 3 m (100 mm) * (When using the E39-R1)	100 mm (White paper 100 x 100 mm)	1 m (White paper 300 x 300 mm)
Setting range		---					
Reflectivity characteristic		---					
Spot Diameter		---					
Standard sensing object		Opaque: 12-mm dia. min.			Opaque: 75-mm dia. min.	---	
Min. sensing object		---					
Differential distance		---				20% max. of sensing distance	
Directional angle		Both emitter and receiver: 3° to 15°		Both emitter and receiver: 3° to 5°	2° to 10°	---	
Light source (wave length)		Infrared LED (870 nm)	Infrared LED (860 nm)	Red LED (700 nm)	Red LED (680 nm)	Infrared LED (860 nm)	
Power supply voltage		12 to 24 VDC ±10%, ripple (p-p) : 10% max.					
Current consumption		emitter: 15 mA receiver: 20 mA			30 mA max.		
Control output		Load power supply voltage 26.4 VDC max., load current 100 mA max. (residual voltage 2 V max.) Open collector output type (depends on the NPN/PNP output format) Light-ON/Dark-ON switch selectable					
BGS / FGS selection		---					
Protective circuits		Reverse polarity protection, output short-circuit protection, mutual interference prevention, output reverse protection	Protection from load short-circuit and reversed power supply connection		Reverse polarity protection, output short-circuit protection, mutual interference prevention, output reverse protection		
Response time		Operation or reset: 2 ms max.	Operation or reset: 1 ms max.				
Sensitivity adjustment		Single-turn adjustment					
Ambient illuminance		Incandescent lamp: 3,000 lux max. Sunlight 10,000 lux max.					
Ambient temperature		Operating: -25°C to 55°C, Storage: -40°C to 70°C (with no icing or condensation)					
Ambient humidity		Operating: 35% to 85% RH, Storage: 35% to 95% RH (with no icing or condensation)					
Insulation resistance		20 MΩ min. at 500 VDC					
Dielectric strength		1,000 VAC at 50/60 Hz for 1 minute					

* Values in parentheses indicate the minimum required distance between the sensor and reflector.

Rating/performance

Diffuse-reflective	Distance-settable	Retro-reflective for PET bottles (without MSR function)		Grooved-type	
narrow-beam		standard-beam	wide-beam		
E3Z-L61/66	E3Z-LS61/66	E3Z-B61/66	E3Z-B62/67	E3Z-G61	E3Z-G62
E3Z-L81/86	E3Z-LS81/86	E3Z-B81/86	E3Z-B82/87	E3Z-G81	E3Z-G82
90 ± 30 mm (White paper 100 x 100 mm)	BGS: White or black paper (100 x 100 mm): 20 mm to set distance FGS: White paper (100 x 100 mm): Set distance to 200 mm min. Black paper (100 x 100 mm): Set distance to 160 mm min.	500 mm (80 mm) * (When using the E39-R1S)	2 m (100 mm) * (When using the E39-R1S)	25 mm 1 optical axis	2 optical axis
---	White paper (100 x 100 mm): 40 to 200 mm Black paper (100 x 100 mm): 40 to 160 mm	---			
Refer to the diagram „Hysteresis Difference vs. Sensing Distance“	Black/white-error: 10% of set distance max.	---			
2.5 mm dia. (when sensing distance is 90 mm)	---				
---		Transparent round PET bottle 500 ml (65 mm dia.)		---	
0.1 mm dia. (copper wire)					

Red LED (650 nm)	Red LED (680 nm)	Red LED (660 nm)		Infrared LED (860 nm)	
12 to 24 VDC ±10%, ripple (p-p) : 10% max.					
30 mA max				25 mA max.	40 mA max.
Load power supply voltage 26.4 VDC max., load current 100 mA max. (residual voltage 2 V max.) Open collector output type (depends on the NPN/PNP output format) Light-ON/Dark-ON switch selectable					
---	BGS: Open or connected to GND FGS: Connected to Vcc	---			
Reverse polarity protection, output short-circuit protection, mutual interference prevention					
Operation or reset: 1 ms max.					
Single-turn adjustment	five-turn endless adjuster	Single-turn adjustment		---	
Incandescent lamp: 3,000 lux max. Sunlight 10,000 lux max.					
Operating: -25°C to 55°C, Storage: -40°C to 70°C (with no icing or condensation)					
Operating: 35% to 85% RH, Storage: 35% to 95% RH (with no icing or condensation)					
20 M min. at 500 VDC					
1,000 VAC at 50/60 Hz for 1 minute					

Rating/performance

Item		Sensor type	Through-beam			Retroreflective model (with M.S.R. function)	Diffuse-reflective	
							wide-beam	standard-beam
Model		NPN output	E3Z-T62/T67	E3Z-T61/T66	E3Z-T61A/T66A	E3Z-R61/R66	E3Z-D61/D66	E3Z-D62/D67
		PNP output	E3Z-T82/T87	E3Z-T81/T86	E3Z-T81A/T86A	E3Z-R81/R86	E3Z-D81/D86	E3Z-D82/D87
Vibration resistance			10 to 55 Hz, 1.5-mm or 300m/s^2 double amplitude for 2 hours each in X, Y, and Z directions					
Shock resistance			Destruction: 500 m/s^2 for 3 times each in X, Y, and Z directions					
Protective structure			IEC 60529 IP67, IP69k after DIN 40050 part 9					
Connection method			Pre-wired (standard length: 2 m/500 mm)/M8 connector					
Indicator lamp			Operation indicator (orange), stability indicator (green) [Note that the emitter has the power indicator (orange) only]					
Weight (Packed state)	Pre-wired models (with 2-m cable)		Approx. 120 g			65 g		
	Connector type		30 g			Approx. 20 g		
Material	Case		PBT (polybutylene terephthalate)					
	Lens		Denatured polyacrylate resin	Methacylate resin				
Accessories			Instruction manual (The Reflector or Mounting Bracket is not provided with any of the above models.)					

Rating/performance

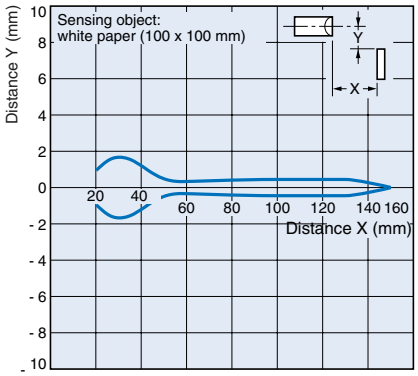
Diffuse-reflective	Distance-settable	Retro-reflective for PET bottles (without MSR function)		Grooved-type	
narrow-beam		standard-beam	wide-beam		
E3Z-L61/66	E3Z-LS61/66	E3Z-B61/66	E3Z-B62/67	E3Z-G61	E3Z-G62
E3Z-L81/86	E3Z-LS81/86	E3Z-B81/86	E3Z-B82/87	E3Z-G81	E3Z-G82
10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions					
Destruction: 500 m/s^2 for 3 times each in X, Y, and Z directions					
IEC 60529 IP67				IEC 60529 IP64	
Pre-wired (standard length: 2 m/500 mm)/M8 connector				Pull-out cable type (standard cable length: 2 m/500 mm) / connector relay type (standard cable length: 300 mm	
Operation indicator (orange), stability indicator (green)				Operation indicator (orange)	
Approx. 65 g		65 g			
Approx. 20 g				30 g	
PBT (polybutylene terephthalate)				ABS	
Methacylate resin	Denaturated polyallylate	Methacylate resin			
Instruction manual (The Reflector or Mounting Bracket is not provided with any of the above models.)					

Caracteristic data (typical)

Operating Range

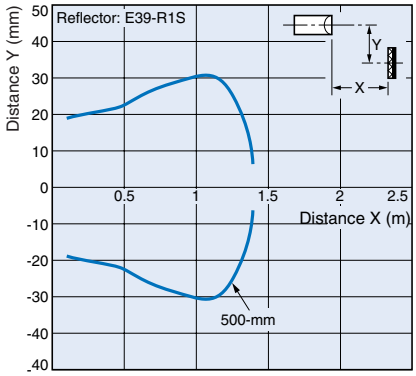
Narrow-beam

E3Z-L

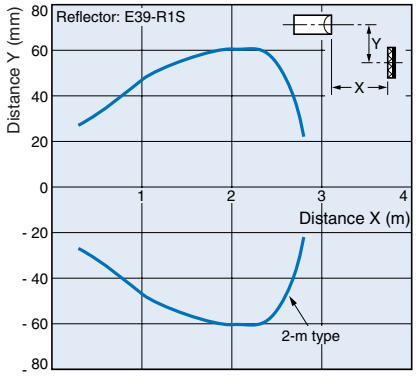


Retroreflective Models for transparent objects

E3Z-B□1/B□6 + E39-R1S
(optional reflector)

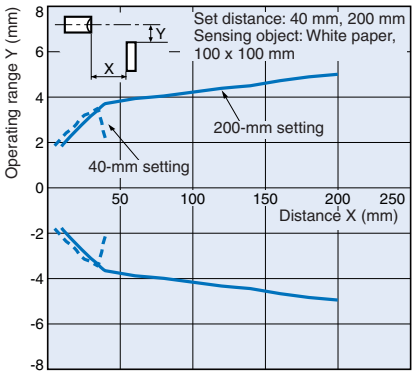


E3Z-B□2/B□7 + E39-R1S
(optional reflector)

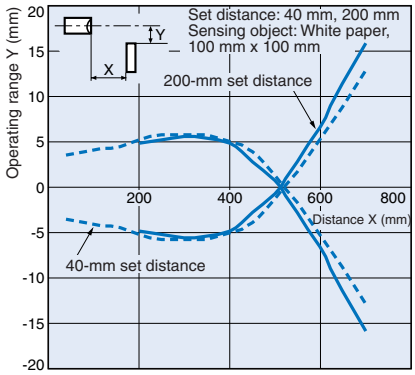


Distance-setting

E3Z-LS [BGS]



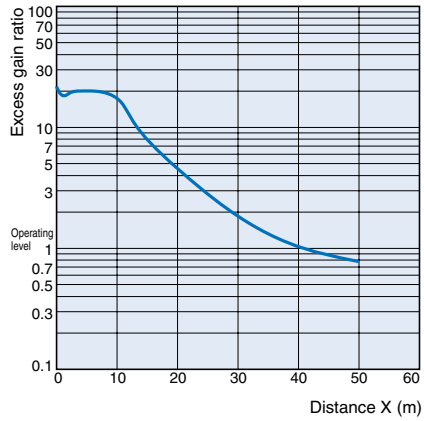
E3Z-LS [FGS]



Excess Gain vs. Distance

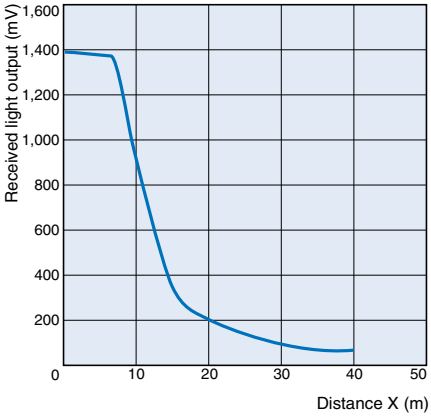
Through-beam

E3Z-T□1(T□6)



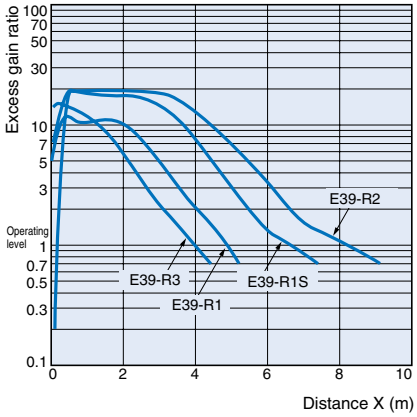
Through-beam

E3Z-T□A

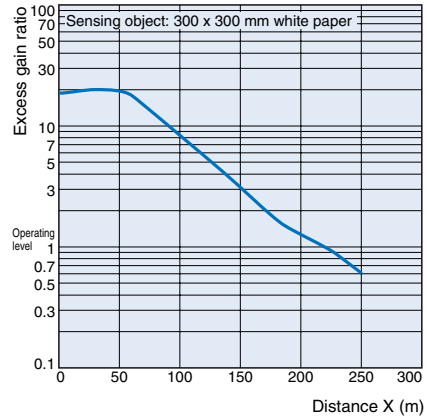


Retroreflective Models

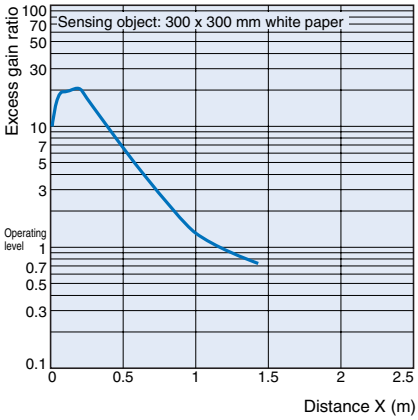
E3Z-R□1(R□6) + Reflectors



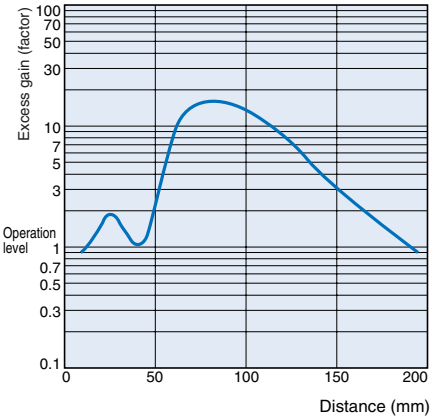
Diffuse-reflective
E3Z-D□1(D□6)



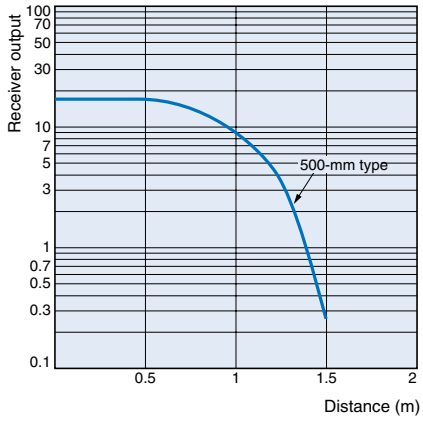
Diffuse-reflective
E3Z-D□2(D□7)



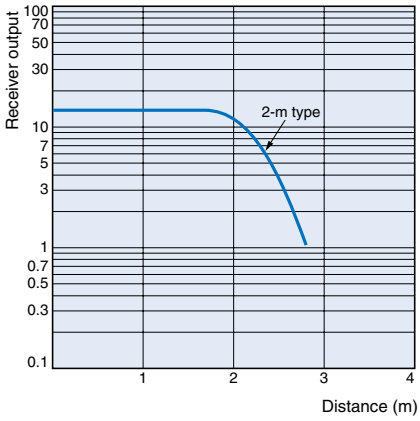
Narrow-beam
E3Z-L



Retro-reflective for transparent objects
E3Z-B□1/B□6 + E39-R1S
(optional reflector)

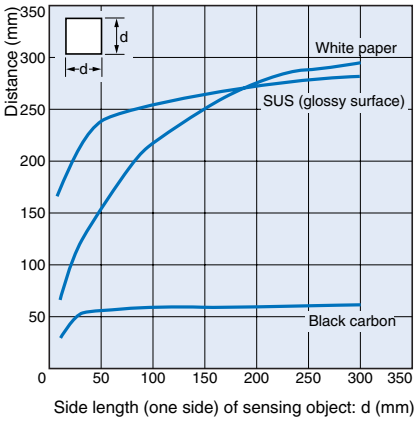


E3Z-B□2/B□7 + E39-R1S
(optional reflector)

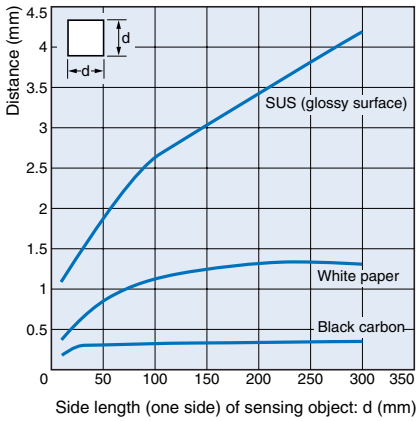


Distance vs. Size

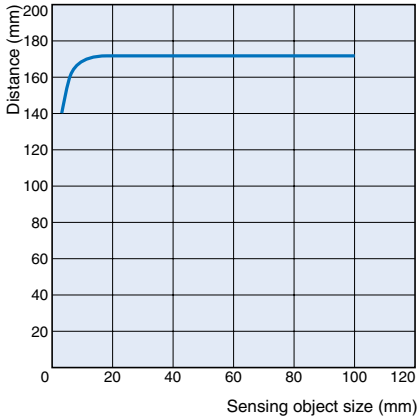
Diffuse-reflective
E3Z-D□1(D□6)



Diffuse-reflective
E3Z-D□2(D□7)



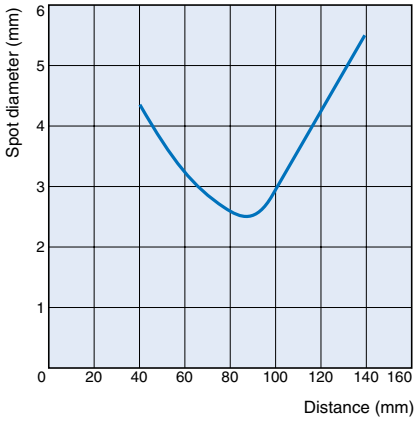
Narrow-beam
E3Z-L



Spot diameter vs. Distance

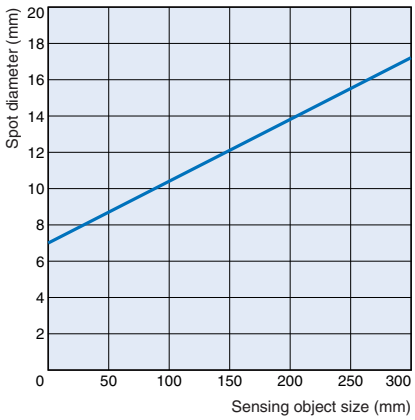
Narrow-beam

E3Z-L



Distance setting

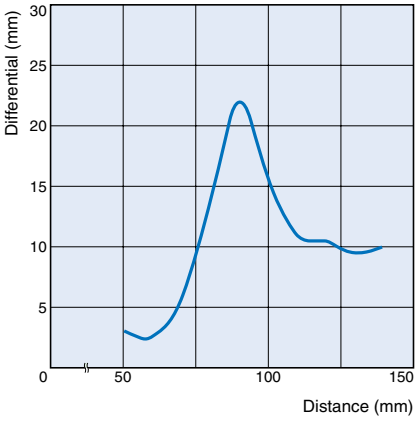
E3Z-LS



Differential travel / Hysteresis vs. Distance

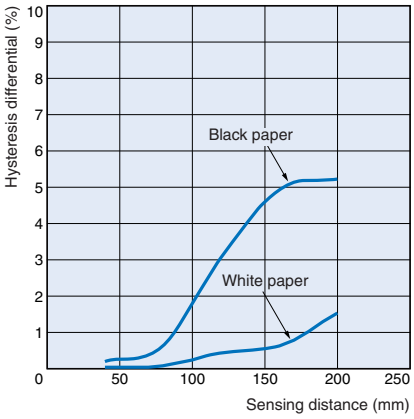
Narrow-beam

E3Z-L



Distance setting

E3Z-LS

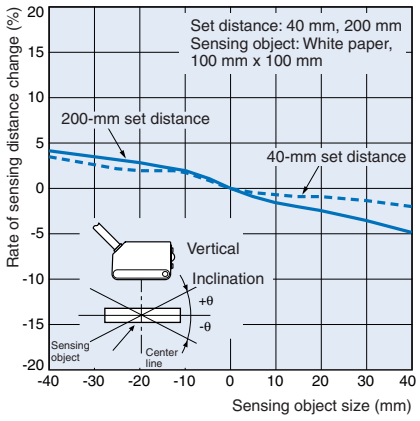


Inclination Characteristics

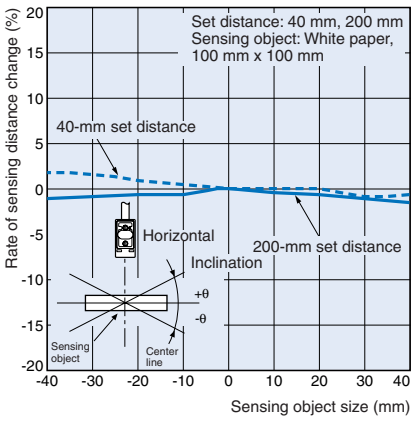
Distance setting

E3Z-LS

Vertical



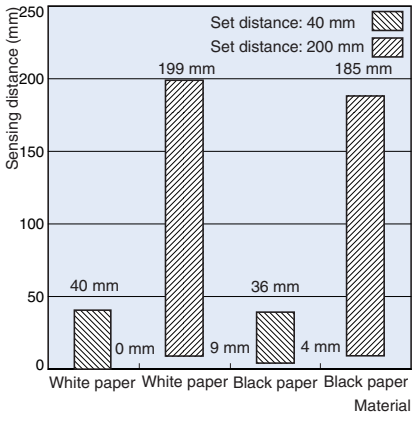
Horizontal



Short-distance Characteristics

Distance setting

E3Z-LS

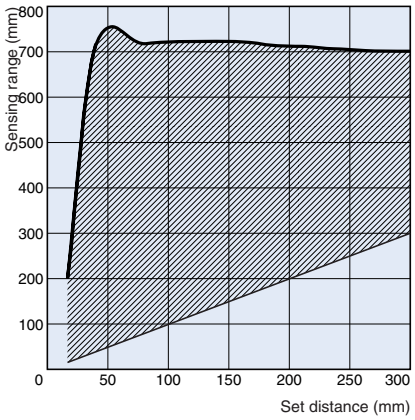


FGS Mode Set Distance vs. Sensing Range

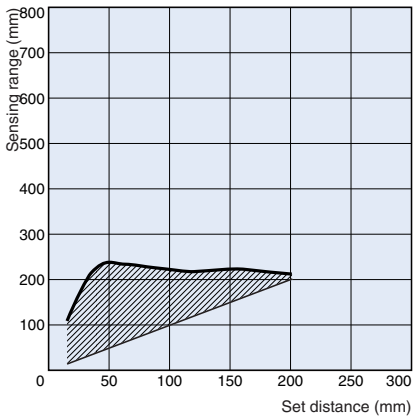
Distance setting

E3Z-LS

White Paper



Black Paper

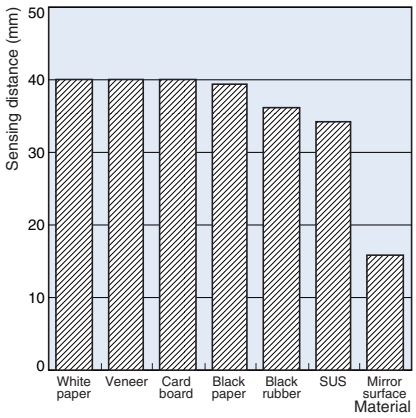


Sensing Distance vs. Material

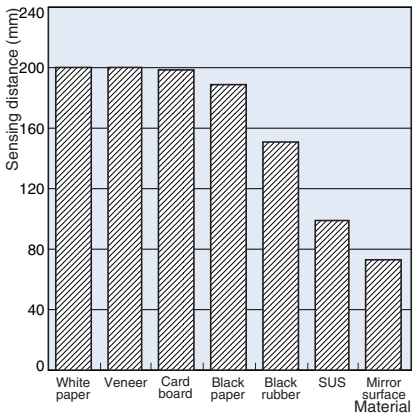
Distance setting

E3Z-LS

At Set Distance of 40 mm

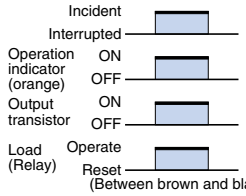
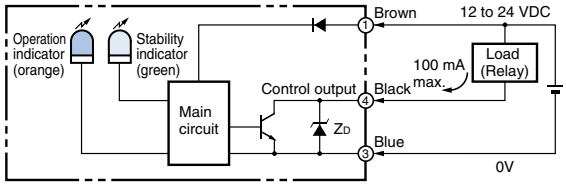


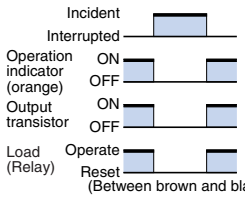
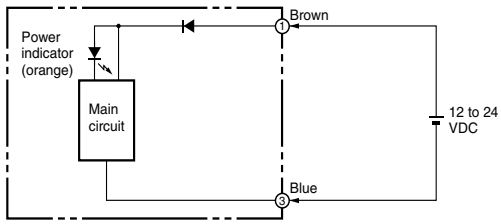
At Set Distance of 200 mm

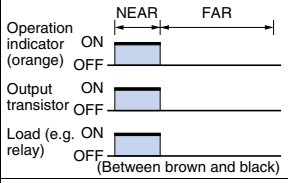
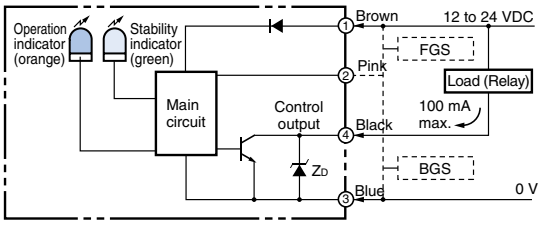


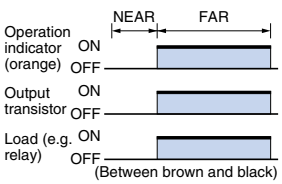
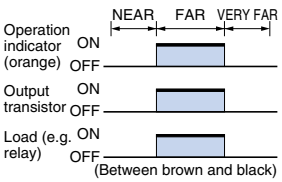
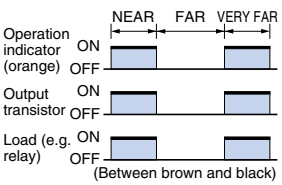
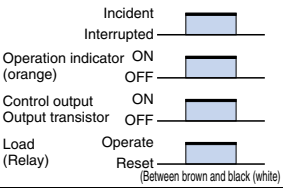
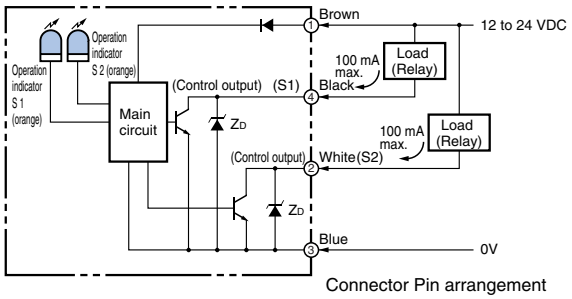
Output Circuit Diagram

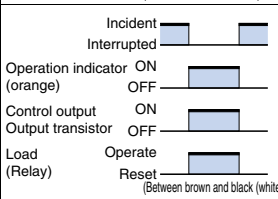
NPN output

<table>
<tr><th>Model</th><th>Output transis-tor Status</th><th>Timing chart</th><th>Mode selec-tion switch</th><th>Output circuit</th></tr>
<tr><td rowspan="3">E3Z-T61
E3Z-T66
E3Z-T61A
E3Z-T66A
E3Z-R61
E3Z-R66
E3Z-D61
E3Z-D66
E3Z-D62
E3Z-D67
E3Z-L61
E3Z-L66
E3Z-B61
E3Z-B62
E3Z-B66
E3Z-B67
E3Z-G61</td><td>Light ON</td><td> 
</td><td>L ON
(LIGHT ON)</td><td rowspan="2">Through-beam receiver Retroreflective model Diffuse-reflective model
 

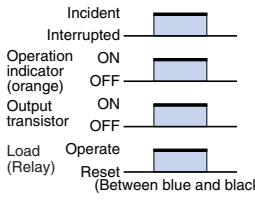
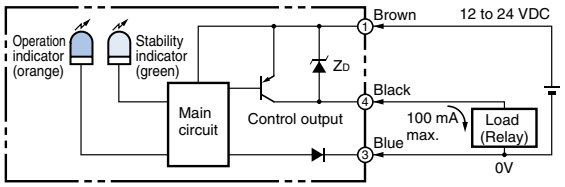
Connector Pin Arrangement
 
Note: Terminal 2 is not used.</td></tr>
<tr><td>Dark ON</td><td> 
</td><td>D ON
(DARK ON)</td></tr>
<tr><td colspan="4">Through-beam emitter
 

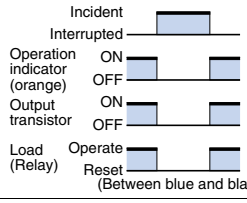
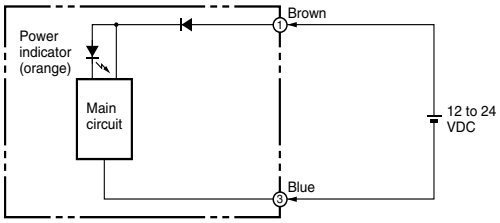
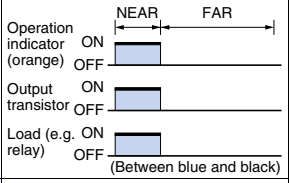
Connector Pin Arrangement
 
Note: Terminal 2 and 4 are not used.</td></tr>
<tr><td rowspan="4">E3Z-LS61
E3Z-LS66</td><td>Light ON</td><td> 
</td><td>L ON
(LIGHT ON)</td><td rowspan="4"> 

Connector Pin Arrangement
 
BGS: Either leave the pink wire (2) open or connect it to the blue wire (3).
FGS: Connect the pink wire (2) to the brown wire (1).</td></tr>
<tr><td>Dark ON</td><td> 
</td><td>D ON
(DARK ON)</td></tr>
<tr><td>Light ON</td><td> 
</td><td>L ON
(LIGHT ON)</td></tr>
<tr><td>Dark ON</td><td> 
</td><td>D ON
(DARK ON)</td></tr>
<tr><td rowspan="2">E3Z-G62</td><td>Light ON</td><td> 
</td><td>L ON
(LIGHT ON)</td><td rowspan="2"> 

Connector Pin arrangement
  </td></tr>
<tr><td>Dark ON</td><td> 
</td><td>D ON
(DARK ON)</td></tr>
</table>

PNP output

<table>
<tr><th>Model</th><th>Output transis-tor Status</th><th>Timing chart</th><th>Mode selec-tion switch</th><th>Output circuit</th></tr>
<tr><td rowspan="2">E3Z-T81
E3Z-T86
E3Z-T81A
E3Z-T86A
E3Z-R81
E3Z-R86
E3Z-D81
E3Z-D86
E3Z-D82
E3Z-D87
E3Z-L81
E3Z-L86
E3Z-B81
E3Z-B82
E3Z-B86
E3Z-B87
E3Z-G81</td><td>Light ON</td><td> 
</td><td>L ON
(LIGHT ON)</td><td rowspan="2">Through-beam receiver Retroreflective model Diffuse-reflective model
 

Connector Pin Arrangement
 
Note: Terminal 2 is not used.</td></tr>
<tr><td>Dark ON</td><td> 
</td><td>D ON
(DARK ON)</td></tr>
<tr><td colspan="4">Through-beam emitter
 
</td><td>Connector Pin Arrangement
 
Note: Terminal 2 and 4 are not used.</td></tr>
<tr><td rowspan="4">E3Z-LS81
E3Z-LS86</td><td>Light ON</td><td> 
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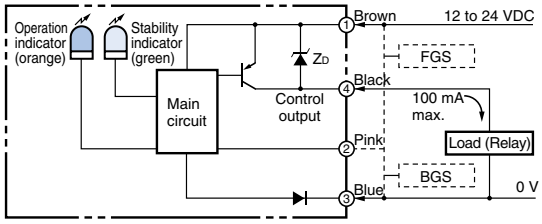
(LIGHT ON)</td><td rowspan="4"> 

Connector Pin Arrangement
 
BGS: Either leave the pink wire (2) open or connect it to the blue wire (3).
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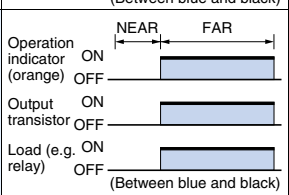
<tr><td>Dark ON</td><td> 
</td><td>D ON
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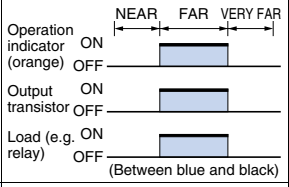
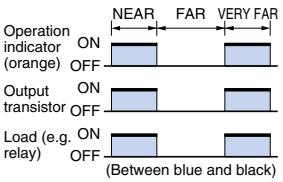
<tr><td>Light ON</td><td> 
</td><td>L ON
(LIGHT ON)</td></tr>
<tr><td>Dark ON</td><td> 
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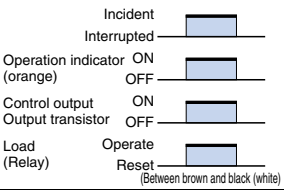
(DARK ON)</td></tr>
<tr><td rowspan="2">E3Z-G82</td><td>Light ON</td><td> 
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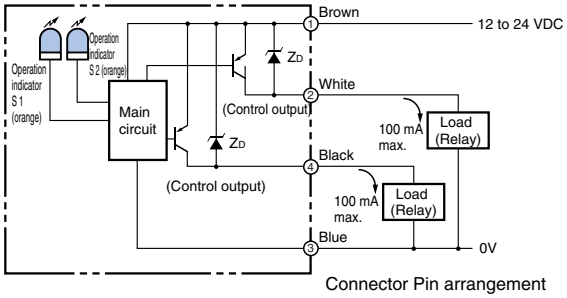
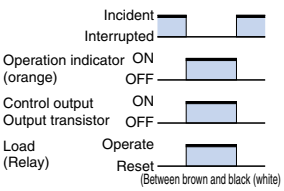
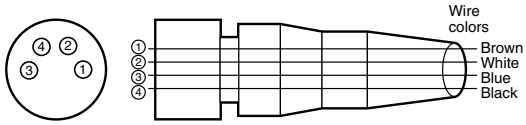
(LIGHT ON)</td><td rowspan="2"> 

Connector Pin arrangement
  </td></tr>
<tr><td>Dark ON</td><td> 
</td><td>D ON
(DARK ON)</td></tr>
</table>

Connectors (Sensor I/O connectors)



XS3F-M421-402-A
XS3F-M421-405-A
XS3F-M422-402-A
XS3F-M422-405-A

Class	Wire, outer jacket color	Connector pin No.	Application		
			Standard	E3Z-LS	E3Z-G62/82
For DC	Brown	①	Power supply (+V)		
	White	②	---	BGS / FGS selection	Output 2 (S2)
	Blue	③	Power supply (0 V)		
	Black	④	Output		Output 1 (S1)

Nomenclature:

Through-beam

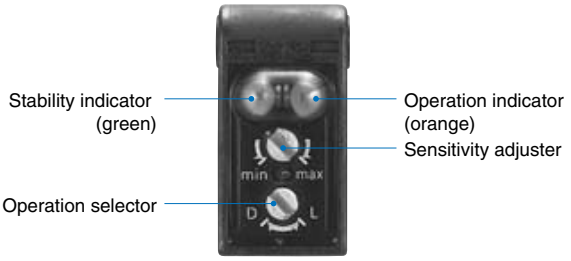
E3Z-T□□ Receiver
E3Z-T□□A Receiver

Diffuse-reflective

E3Z-D□□
E3Z-L□□

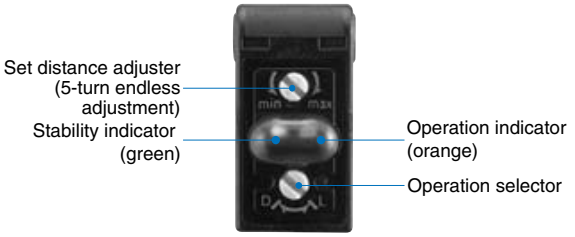
Retroreflective Models

E3Z-R□□
E3Z-B□□



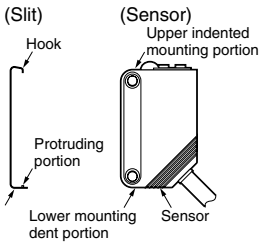
Distance-setting

E3Z-LS□□



Operation

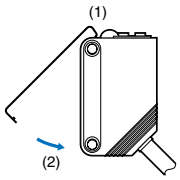
Slit for through-beam model (Optional accessory: E39-S65A/B/C/D/E/F)



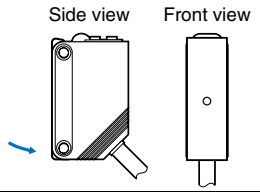
Mounting method

1. Hook the upper protruding portions of the Slit to the upper indented mounting portion of the Sensor and adjust the position of the Slit so that the Slit will be parallel to the lens surface.

2. Press the lower protruding portion of the Slit onto the indented mounting portion of the Sensor until the Slit snaps in.



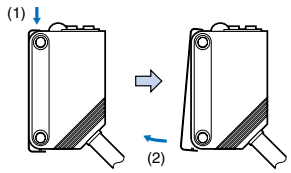
Mounting condition



Demounting method

1. Press the upper portion of the Slit.

2. Disconnect the lower protruding portion of the Slit from the Sensor and remove the Slit.

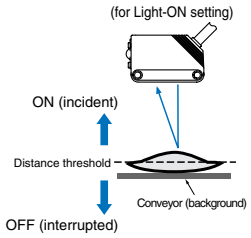


BGS / FGS Application for distance setting E3Z-LS

Simple Detection of Glossy, Uneven Objects

BGS (Background Suppression)

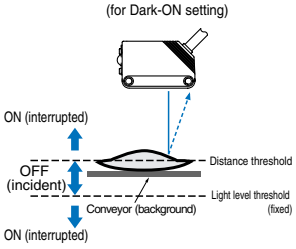
Objects beyond the set distance, such as the conveyor, will not be detected. The hysteresis is 10% or less, so at a set distance of 40 mm, steps with a thickness of 4 mm can be detected on objects.

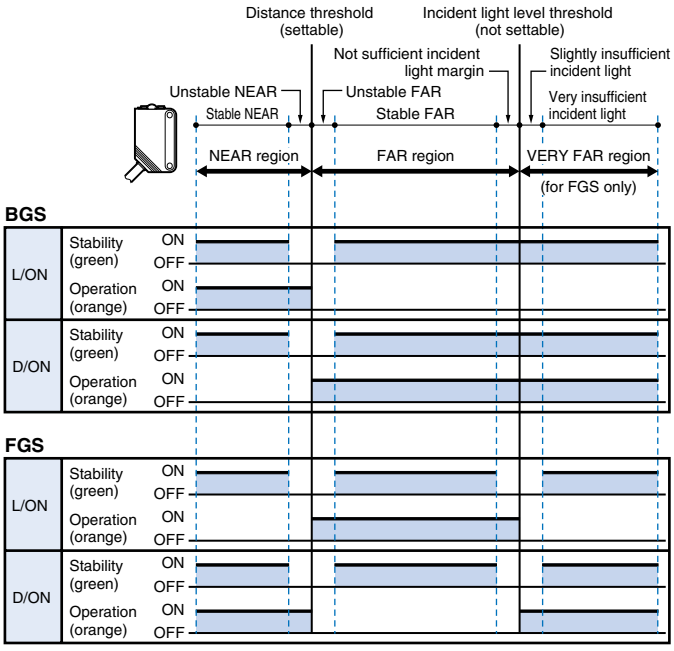


Selectable by Changing Cable Connection

FGS (Foreground Suppression)

Glossy, uneven objects are reliably detected because the OFF (incident) status occurs only when the conveyor is detected, and ON (interrupted) status occurs only when an object exists or when reflected light is not returned to the Sensor. (Depending on the shape of the object, an OFF-delay timer may be required.)





Precautions

⚠ Caution

Do not connect an AC power supply to the Sensor. If AC power (100 VAC or more) is supplied to the Sensor, it may explode or burn.

Be sure to abide by the following precautions for the safe operation of the Sensor.

Wiring

Power Supply Voltage and Output Load Power Supply Voltage

Make sure that the power supply to the Sensor is within the rated voltage range. If a voltage exceeding the rated voltage range is supplied to the Sensor, it may explode or burn.

Load Short-circuiting

Do not short-circuit the load, otherwise the Sensor may be damaged.

Connection without Load

Do not connect the power supply to the Sensor with no load connected, otherwise the internal elements may explode or burn.

Operating Environment

Do not use the Sensor in locations with explosive or flammable gas.

Correct Use

Design

Power Reset Time

The Sensor is ready to operate 100 ms after the Sensor is turned ON. If the load and Sensor are connected to independent power supplies respectively, be sure to turn ON the Sensor before supplying power to the load.

Wiring

Avoiding Malfunctions

If using the Photoelectric Sensor with an inverter or servomotor, always ground the FG (frame ground) and G (ground) terminals, otherwise the Sensor may malfunction.

Mounting

Mounting the Sensor

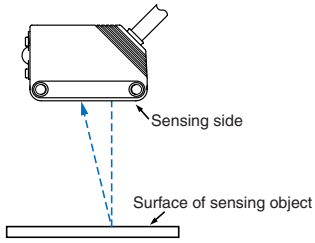
- If Sensors are mounted face-to-face, make sure that the optical axes are not in opposition to each other. Otherwise, mutual interference may result.
- Always install the Sensor carefully so that the aperture angle range of the Sensor will not cause it to be directly exposed to intensive light, such as sunlight, fluorescent light, or incandescent light.
- Do not strike the Photoelectric Sensor with a hammer or any other tool during the installation of the Sensor, or the Sensor will lose its water-resistive properties.
- Use M3 screws to mount the Sensor.
- When mounting the case, make sure that the tightening torque applied to each screw does not exceed 0.54 Nm.

M8 Connector

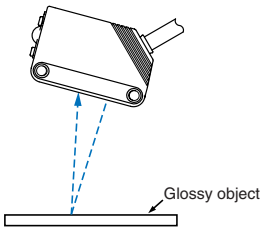
- Always turn OFF the power supply to the Sensor before connecting or disconnecting the metal connector.
- Hold the connector cover to connect or disconnect it.
- Secure the connector cover by hand. Do not use pliers, otherwise the connector may be damaged.
- If the connector is not connected securely, it may be disconnected by vibration or the proper degree of protection of the Sensor may not be maintained.

Distance setting models E3Z-LS

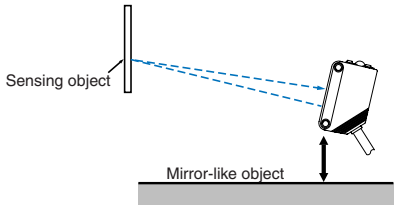
- Make sure that the sensing side of the Sensor is parallel with the surface of the sensing objects. Normally, do not incline the Sensor towards the sensing object.



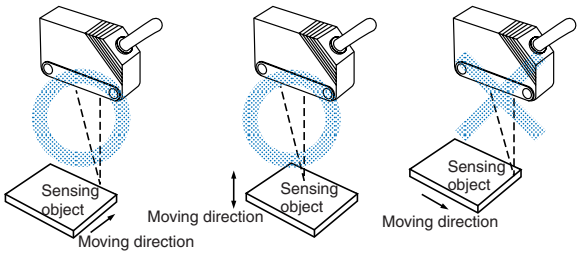
If the sensing object has a glossy surface, however, incline the Sensor by 5° to 10° as shown in the illustration, provided that the Sensor is not influenced by background objects.



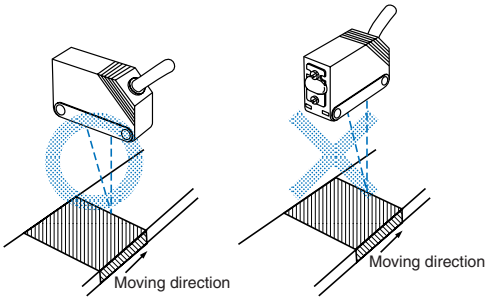
- If there is a mirror-like object below the Sensor, the Sensor may not operate stably. Therefore, incline the Sensor or separate the Sensor from the mirror-like object as shown below.



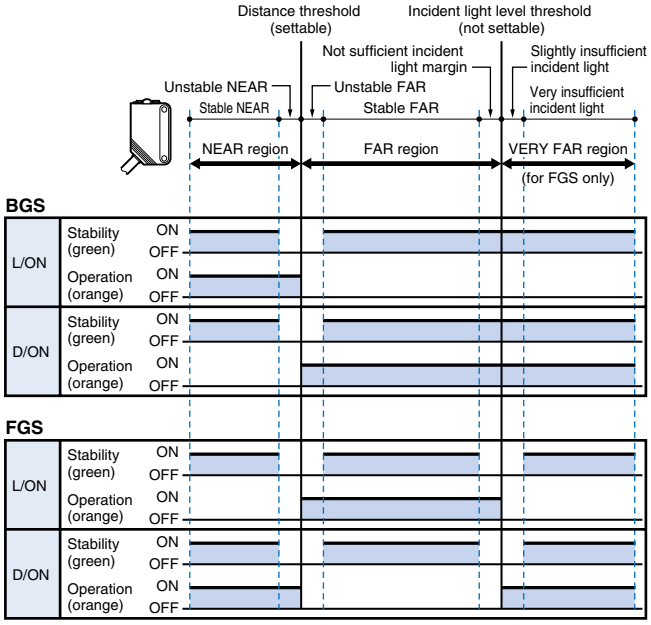
- Do not install the Sensor in the wrong direction. Refer to the following illustration.



Install the Sensor as shown in the following illustration if each sensing object greatly differs in color or material.



Adjustments-indicator operation



Note: 1 . If the stability indicator is lit, the detection/no detection status is stable within the rated ambient operating temperature (-25 to 55°C).
2 . The VERY FAR region is supported only for FGS. The incident light threshold is fixed and cannot be set. The distance to the incident light threshold depends on the color and gloss of the sensing object's surface.

Retro-reflective for transparent objects E3Z-B

Design

Bottles

The Sensor may be unable to achieve stable detection depending on the shape of bottles. Be sure to verify stable detection before using the Sensor.

Mounting

Sensor Mounting

If the Sensor fails to provide stable detection due to the shape of bottles, adjust the location and inclination of the Sensor.

Inspection and Maintenance

Cleaning

Never use paint thinners or other organic solvents to clean the surface of the product.

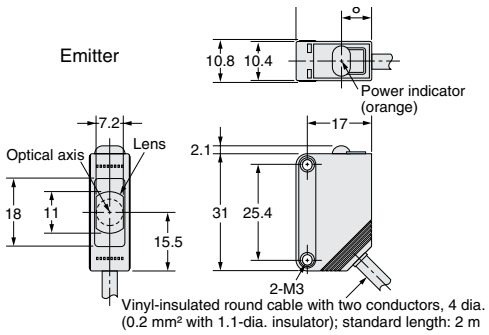
Dimensions (Unit: mm)

Sensors

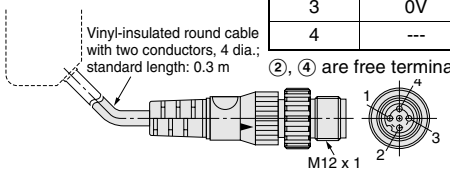
Through-beam

Pre-wired

E3Z-T61
E3Z-T81
E3Z-T61A

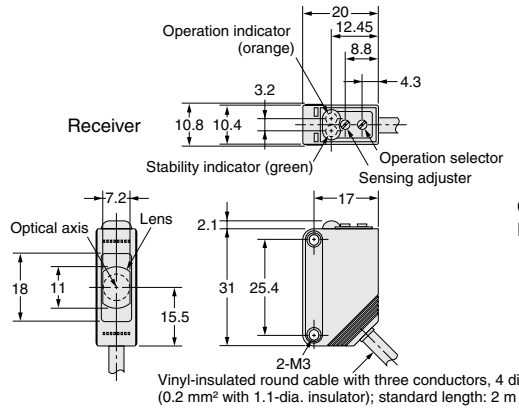


Connector relay models
E3Z-T61-M1J

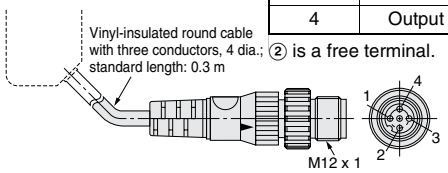


Terminal No.	Specifications
1	+V
2	---
3	0V
4	---

②, ④ are free terminals.



Connector relay models
E3Z-T61-M1J



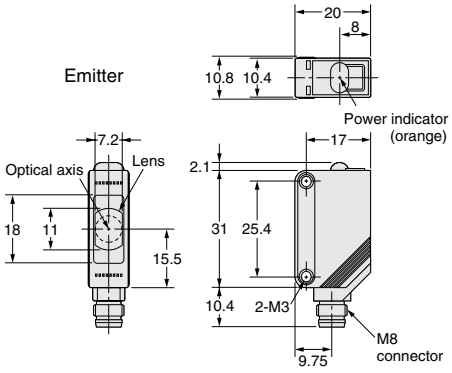
Terminal No.	Specifications
1	+V
2	---
3	0V
4	Output

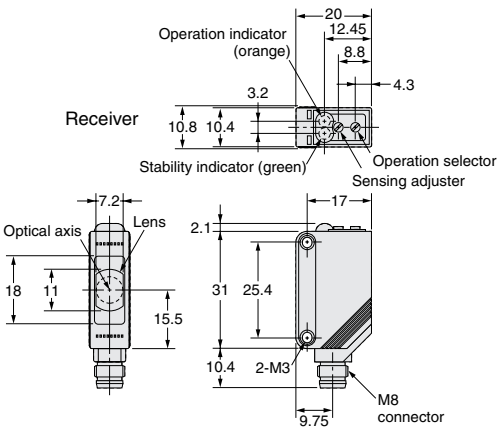
② is a free terminal.

Through-beam

Connector type

E3Z-T66
E3Z-T86
E3Z-T66A





Retroreflective Models

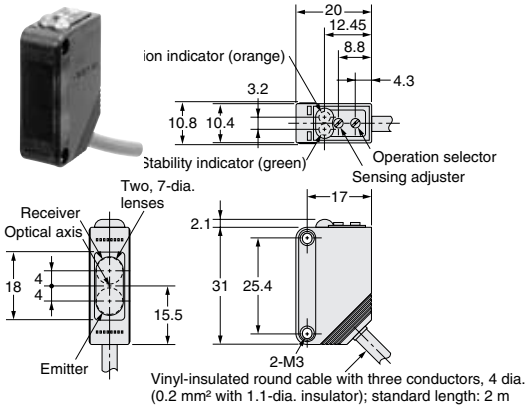
Pre-wired

E3Z-B61
E3Z-B62
E3Z-B81
E3Z-B82
E3Z-R61
E3Z-R81

Diffuse-reflective

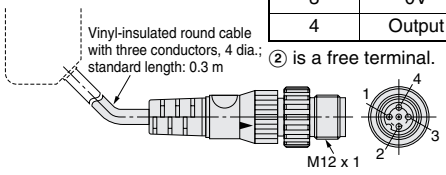
Pre-wired

E3Z-D61
E3Z-D81
E3Z-D62
E3Z-D82
E3Z-L61
E3Z-L81



Connector relay models
(E3Z-□□□-M1J)

Terminal No.	Specifications
1	+V
2	---
3	0V
4	Output



Retroreflective Models

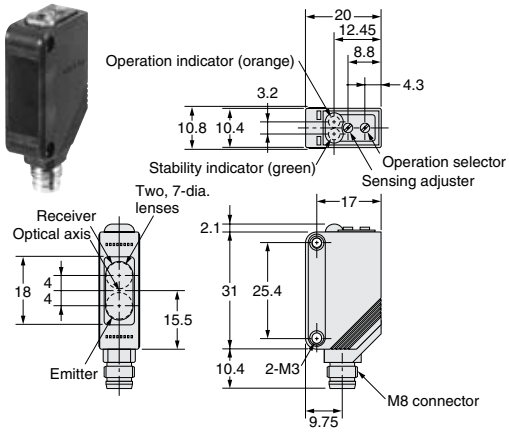
Connector type

E3Z-B66
E3Z-B67
E3Z-B86
E3Z-B87
E3Z-R66
E3Z-R86

Diffuse-reflective

Connector type

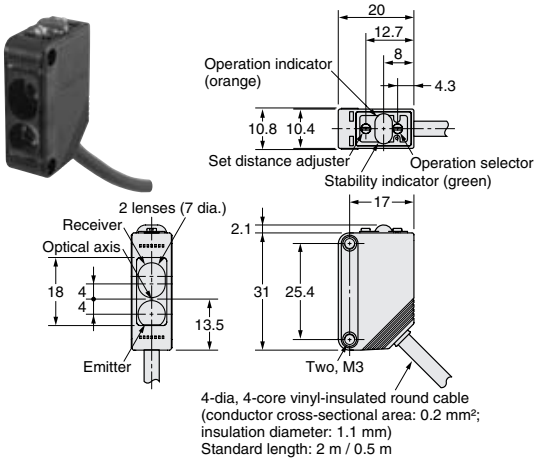
E3Z-D66
E3Z-D86
E3Z-D67
E3Z-D87
E3Z-L66
E3Z-L86



Distance-settable Models

Pre-wired models

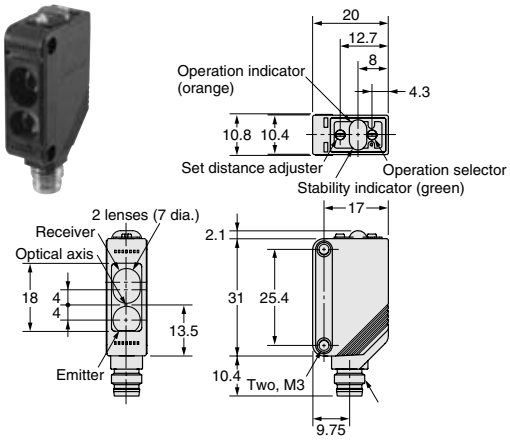
E3Z-LS61
E3Z-LS81



Distance-settable Models

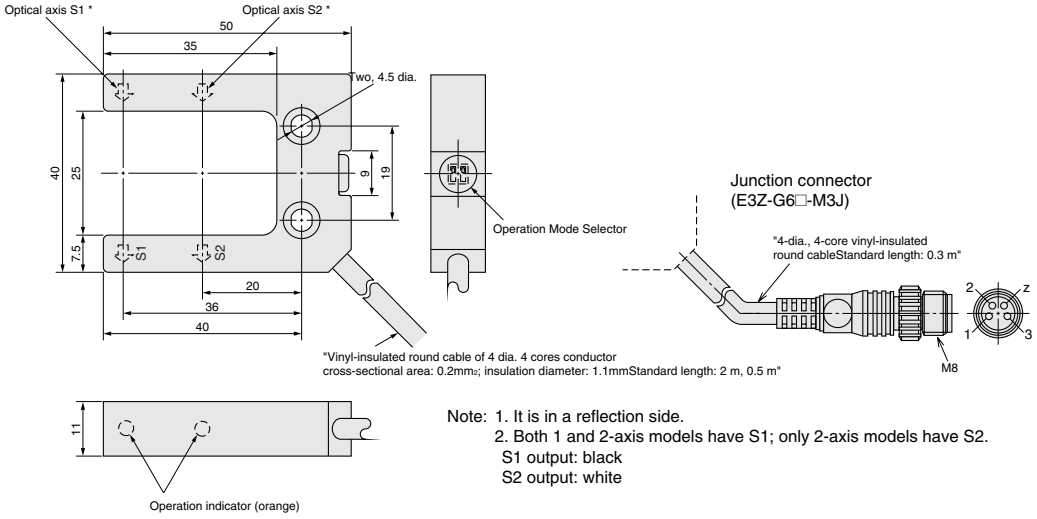
Connector type

E3Z-LS66
E3Z-LS86



Grooved-type Models

E3Z-G

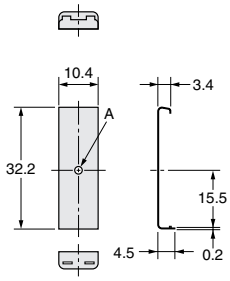


Note: 1. It is in a reflection side.
2. Both 1 and 2-axis models have S1; only 2-axis models have S2.
S1 output: black
S2 output: white

Accessories (Order Separately)

Slits

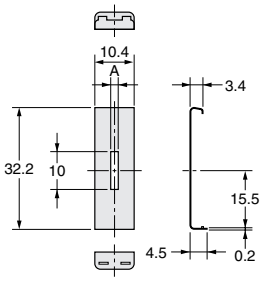
E39-S65A
E39-S65B
E39-S65C



Model	Dimension A	Material
E39-S65A	0.5-mm dia.	Stainless steel (SUS301)
E39-S65B	1.0-mm dia.	
E39-S65C	2.0-mm dia.	

Slits

E39-S65D
E39-S65E
E39-S65F



Model	Dimension A	Material
E39-S65D	0.5	Stainless steel (SUS301)
E39-S65E	1.0	
E39-S65F	2.0	

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E701-E2-01-X

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

Ultra small size sensors in plastic housing

E3T

- Ultra small size with high power pin point LED where space is crucial
- 3.5 mm thin flat shape or 7 mm wide side view shape

Features

4 detection methods for selection according to work and space

Through-beam model

The side-view type has realized long, 1 m distance detection. Furthermore, it can detect a small, 0.5 mm or less dia. work with a pin-point beam (when slit is fitted). The visible light spot and narrow-visibility beam ensure a stable detection of lead frames and chip parts.

Diffuse reflective model

3.5 mm thin size and can be installed to a gap etc. The pin-point beam makes sensing position check easy, and the sensor is insensitive to the background and surrounding metal, ensuring stable detection.

Limited reflective model

Having the smallest size, this type can detect a merely 0.15 mm small object. In addition to this, it is insensitive to the background and surrounding metal, thus, ensuring a stable detection. The pin-point beam allows a clear vision of a red light spot, facilitating a sensing position check.

Retroreflective model

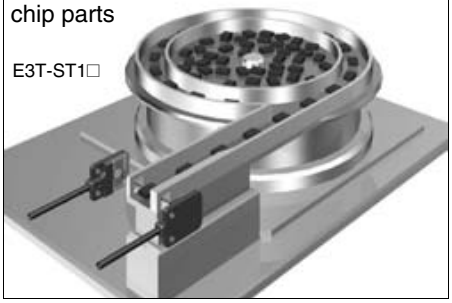
The world first coaxial Retroreflective type in this size. When used with a small reflector, this sensor completes 2 mm dia. small work detection and 200 mm sensing distance. The switch detects small works, such as IC chips on tape, and the pin-point beam makes optical axis adjustment easy, achieving stable detection.

Application

Through-beam

Detection of passing/staying parts on parts feeder
Stable detection of small works such as chip parts

E3T-ST1□



Diffuse-reflective

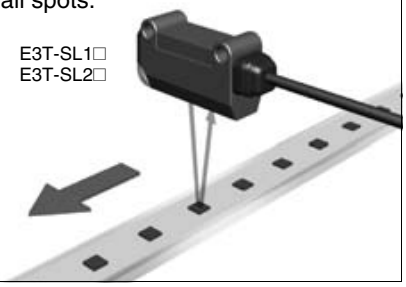
Detection of seated wafer cassette
Thin size. Can be mounted to a gap or like.

E3T-FD1□

Limited reflective

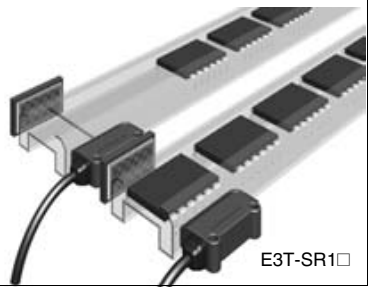
Detection of chip parts on tape (Taping machine)
Can detect small parts on 1 mm dia. small spots.

E3T-SL1□
E3T-SL2□



Retroreflective Models

Detection of stick full of ICs (IC handler/ DIP.SOP)
Retroreflection halves wiring man-hours.



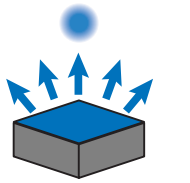
E3T-SR1□

Features

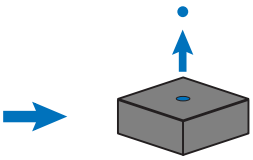
The hyper LED issues a 0.8 mm dia. pin-point beam (E3T-SL1□) Small works can be detected

The hyper LED performs a high-output narrow-visibility beam of 0.8 mm spot diameter (E3T-SL1□). A red spot can be seen clearly and optical axis alignment and detection position check become easy. Besides, the LED is insensitive to the work color and background and can detect a small work securely.

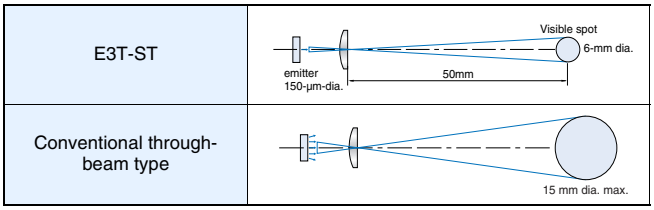
High output pin-point light source
LED (wave length: 650 mm)



The conventional LED emits light from its surface. It has a large degree of light dispersion, increasing the loss when creating a small beam.



The hyper LED emits light from a small point. It has a small degree of light dispersion, achieving a loss-free, high-output, narrow-visibility beam.



One-chip photo IC ensures high reliability.

The incident photo diode and analog/digital signal processing circuit are integrated densely into the one-chip fully customized IC in use. This photoelectric sensor has high reliability in the ultra small size.

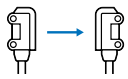
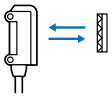
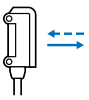
Equipped with OMRON's original FAO, this photoelectric sensor has achieved the world's first coaxial retroreflective type.

The FAO (FREE ANGLE OPTICS), or special beam splitter having multiple layers of dielectric films on a glass, has implemented the ultra small coaxial retroreflection. It can detect a small 2 mm dia. work, provides sensing position accuracy equivalent to that of the through-beam type, reducing wiring man-hours.

Ordering Information

Sensors

Red light

Sensor type	Shape		Connection method	Sensing distance	Output form	Model	
						NPN output *1	PNP output
Through-beam	Side-view		Pre-wired models	1m	Light ON	E3T-ST11	E3T-ST13
					Dark ON	E3T-ST12	E3T-ST14
	Flat			500mm	Light ON	E3T-FT11	E3T-FT13
					Dark ON	E3T-FT12	E3T-FT14
Retroreflective	Side-view			200mm [10mm] *2	Light ON	E3T-SR11	E3T-SR13
					Dark ON	E3T-SR12	E3T-SR14
Diffuse reflective	Flat			5 to 30 mm	Light ON	E3T-FD11	E3T-FD13
					Dark ON	E3T-FD12	E3T-FD14
Limited reflective	Side-view			5 to 15 mm	Light ON	E3T-SL11	E3T-SL13
					Dark ON	E3T-SL12	E3T-SL14
				5 to 30 mm	Light ON	E3T-SL21	E3T-SL23
					Dark ON	E3T-SL22	E3T-SL24

*1. The robot cable type is available. Its type ends with "R". (Example: E3T-ST11R)

*2. Values in parentheses indicate the minimum required distance between the sensor and reflector.

Accessories (Order Separately)

Slits

Slit width	Sensing distance (typical)	Minimum sensing object (typical)	Model	Quantity	Remarks
0.5 mm dia.	100 mm	0.5 mm dia.	E39-S63	One each for Emitter and Receiver; common with Slit widths of 1 dia. and 0.5 dia.	(Plug-in type round slit) Can be used with the through-beam E3T-ST1□.
1 mm dia.	300 mm	1 mm dia.			
0.5 mm dia.	50 mm	0.5 mm dia.	E39-S64		(Plug-in type round slit) Can be used with the through-beam E3T-FT1□.
1 mm dia.	100 mm	1 mm dia.			

Reflectors

Name	Sensing distance (typical)	Minimum sensing object (typical)	Model	Quantity	Remarks
Small reflector	200 mm [10 mm] * (rated value)	2 mm dia.	E39-R4	1	Attached to the E3T-SR1□ Retroreflective model.
	100 mm (10 mm)*		E39-R37		---

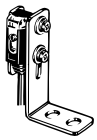
* Values in parentheses indicate the minimum required distance between the sensor and reflector.

Note: 1 . When the reflector used is other than the supplied one, set the sensing distance to about 0.7 times of the typical example as a guideline.
2 . Refer to the "Reflector list".

Sensitivity Adjustment Unit

Shape	Sensing distance (typical)	Model	Quantity	Remarks
	300 to 800 mm	E39-E10	1	For E3T-ST1□

Mounting Brackets

Shape	Model	Quantity	Remarks
	E39-L116	1	Can be used with the side-view E3T-S□□□.
	E39-L117		
	E39-L118		
	E39-L119		Can be used with the flat E3T-F□□□.
	E39-L120		

Note: 1 . If a through-beam model is used, order two Mounting Brackets for the emitter and receiver respectively.
2 . For details, refer to "Mounting bracket list".

Rating/performance

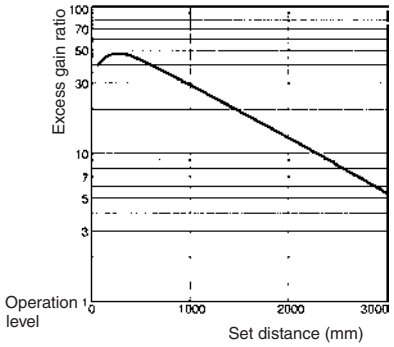
E3T-□□□□

Item	Through-beam				Retroreflective		Limited reflective				Diffuse reflective	
	Side-view		Flat		Side-view						Flat	
	NPN	PNP	NPN	PNP	NPN	PNP	NPN	PNP	NPN	PNP	NPN	PNP
Light-ON	-ST11	-ST13	-FT11	-FT13	-SR11	-SR13	-SL11	-SL13	-SL21	-SL23	-FD11	-FD13
Dark-ON	-ST12	-ST14	-FT12	-FT14	-SR12	-SR14	-SL12	-SL14	-SL22	-SL24	-FD12	-FD14
Sensing distance	1 m (Sensitivity Adjustment Unit is available)		500 mm		200 mm (10 mm) (see note) (with the E39-R4)		5 to 15 mm (50 x 50 mm white paper)		5 to 30 mm (50 x 50 mm white paper)		5 to 30 mm (50 x 50 mm white paper)	
Standard sensing object (white paper)	Opaque, 2 dia. min.				Opaque, 27 dia. min.		---					
Min. sensing object (typical)	Opaque, 2 dia. min.				2 dia. (sensing distance of 100 mm)		0.15 dia. (sensing distance of 10 mm)					
Differential travel	---						2 mm max.		6 mm max.		6 mm max.	
Directional angle	Emitter: 3° to 10° Receiver: 3 to 70°		Emitter: 3° to 13° Receiver: 3 to 70°		Emitter: 2° to 5°		---					
Light source (wave length)	Red LED ("Pin-point" LED) (λ=650 nm)											
Power supply voltage	12 to 24 VDC ±10%, ripple (p-p) 10% max.											24 VDC ±10%
Current consumption	Emitter/Receiver: 12 mA max.				20 mA max.							
Control output	Open collector, load current: 50 mA max. at 24 VDC, residual voltage: 1 V max., operation mode: Light ON or Dark ON (separate models)											
Circuit protection	Protection from reversed power supply connection and output short-circuit				Protection from reversed power supply connection, output short-circuit, and mutual interference							
Response time	1 ms max. each for operation and release											
Ambient illumination (on Receiver lens)	Incandescent lamp: 5,000 ℓx max. Sunlight: 10,000 ℓx max.											
Ambient temperature	Operating: -25°C to 55°C Storage: -40°C to 70°C (with no icing or condensation)											
Ambient humidity	Operating: 35% to 85% Storage: 35% to 95% (with no condensation)											
Insulation resistance	20 M 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 (approx. 30G) for 0.5 hrs each in X, Y, and Z directions											
Shock resistance	Destruction: 1,000 m/s² (approx. 100G) 3 times each in X, Y, and Z directions											
Degree of protection	IEC60529: IP67											
Connection method	Prewired (standard length: 2 m)											
Weight (with packaging)	Approx. 40 g				Approx. 20 g							
Materials	Case: PBT Lens and cover: Polycarbonate											
Accessories	Phillips-head screws (side-view type: M2 x 14, flat type: M2 x 8), nuts, spring washers, flat washers, instruction sheet, and Reflector (for retroreflective model only)											

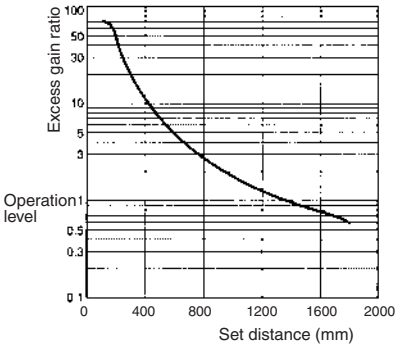
Engineering Data

Excess Gain vs. Set Distance (Typical)

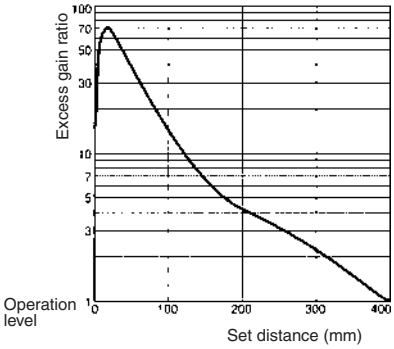
E3T-ST1□ (Through-beam)



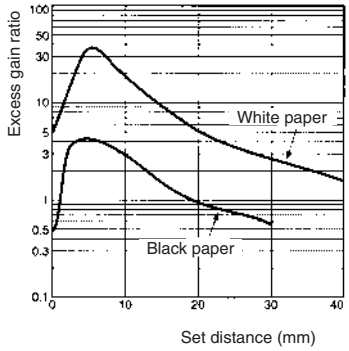
E3T-FT1□ (Through-beam)



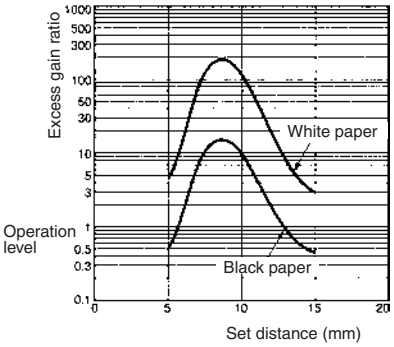
E3T-SR1□ with E39-R4 (Retroreflective)



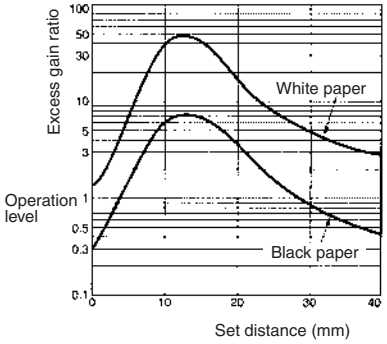
E3T-FD1□ (Diffuse Reflective)



E3T-SL1□ (Limited Reflective)



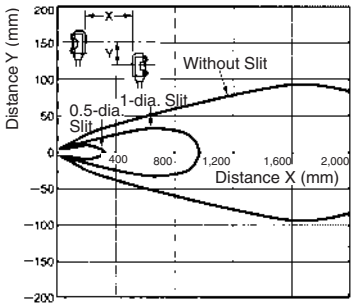
E3T-SL2□ (Limited Reflective)



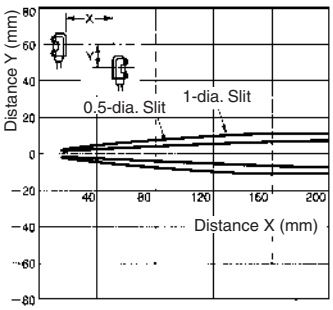
Parallel Operating Range (Typical)

(Through-beam)

E3T-ST1□ with Slit

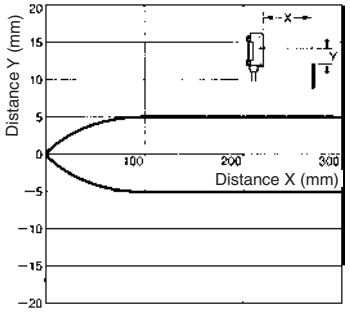


E3T-ST1□ with Slit (Enlarged graph)

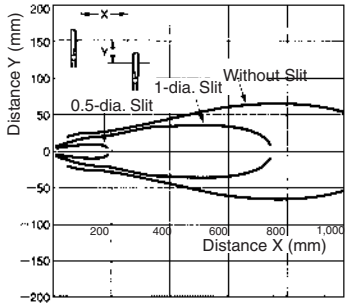


(Retroreflective)

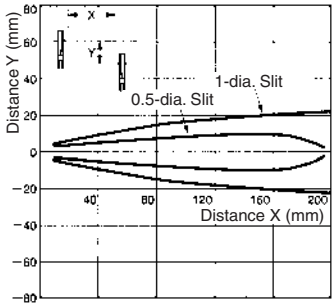
E3T-SR1□ with E39-R4



E3T-FT1□ with Slit



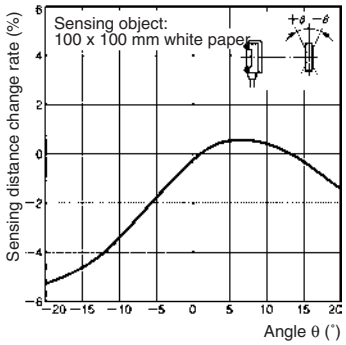
E3T-FT1□ with Slit (Enlarged graph)



Angle Characteristics (Typical)

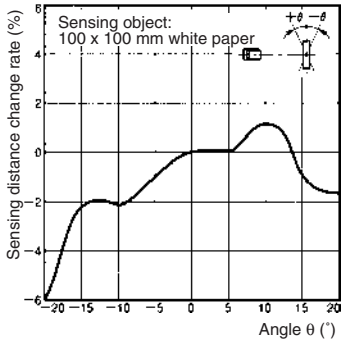
E3T-SL1□

(Up and Down)



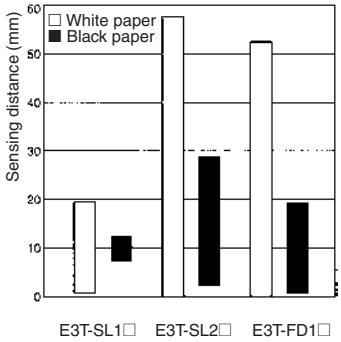
EE3T-SL1□

(Left and Right)



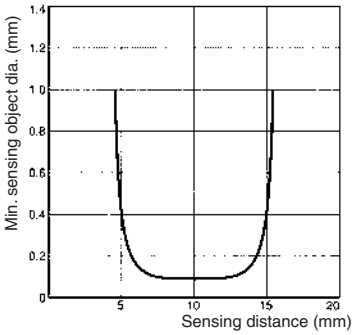
Close-distance Sensing Capability (Typical)

E3T-SL1□, E3T-SL2□, E3T-FD1□

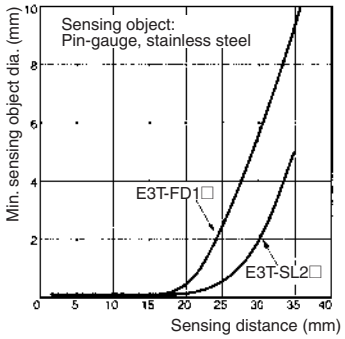


Sensing Object Size vs. Sensing Distance (Typical)

E3T-SL1□

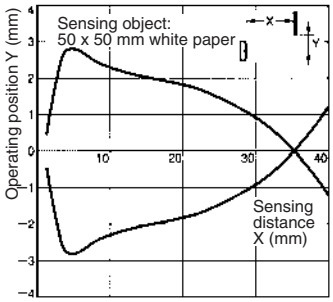


E3T-SL1□

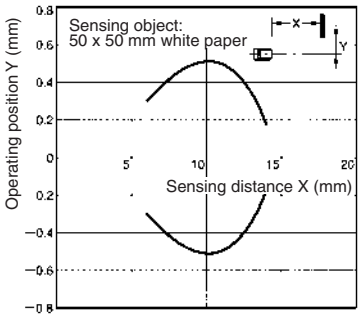


Operation Range (Typical)

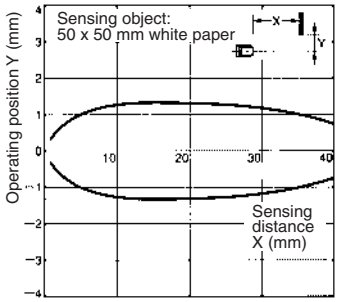
E3T-FD1□ (Diffuse Reflective)



E3T-SL1□ (Limited Reflective)

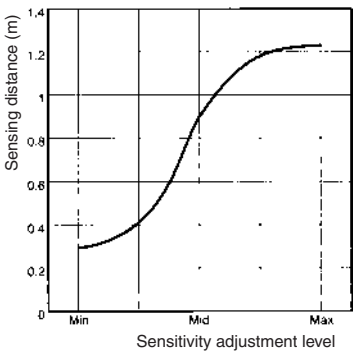


E3T-SL2□ (Limited Reflective)



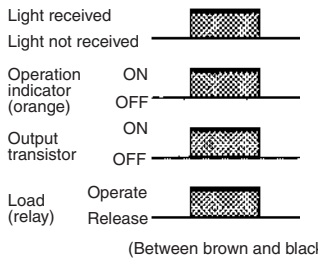
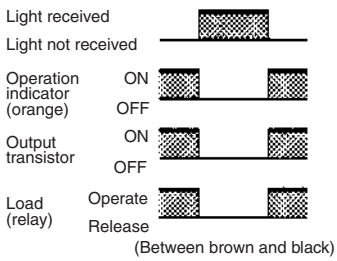
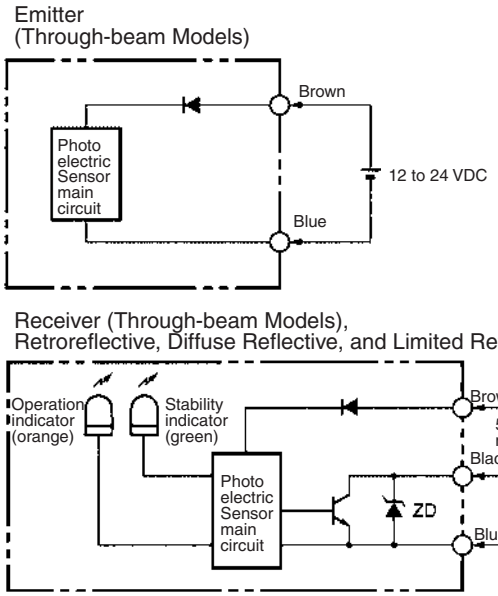
Sensing Distance Characteristics of Sensitivity Adjustment Unit (when completing optical axis adjustment)

E3T-SL1□ with E39-E10

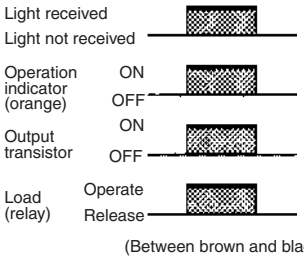
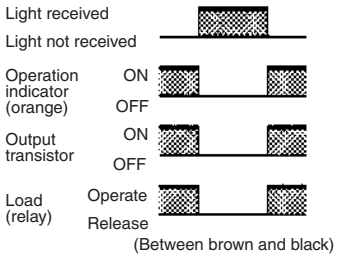
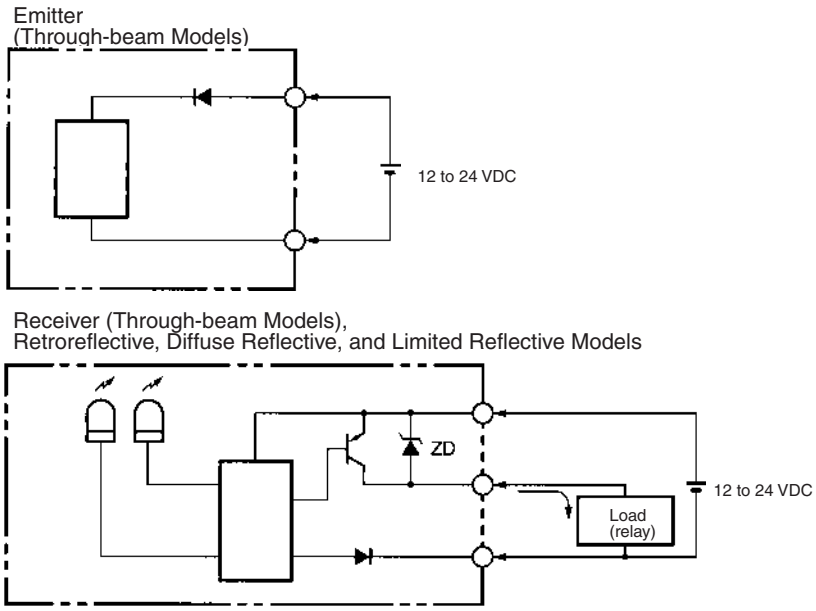


Operation

NPN Output Configuration

Model	E3T-□□□1	E3T-□□□2
State of output transistor	Light ON	Dark ON
Timing chart		
Output circuit		

PNP Output Configuration

Model	E3T-□□□3	E3T-□□□4
State of output transistor	Light ON	Dark ON
Timing chart		
Output circuit		

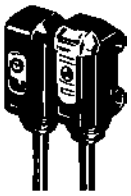
Dimensions

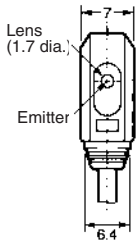
Note: All units are in millimeters unless otherwise indicated.

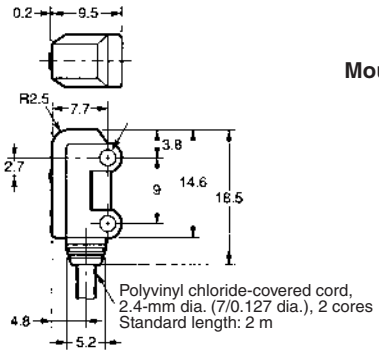
Photoelectric Sensors

Through-beam Models (Side-view Type)

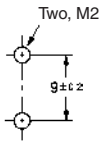
E3T-ST1□ (Emitter)



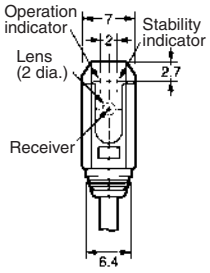


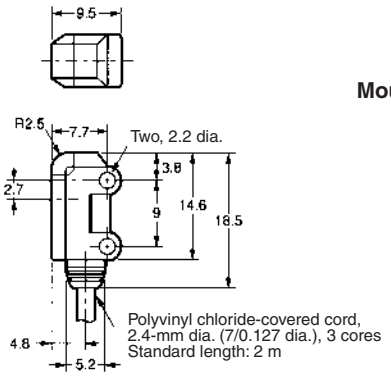


Mounting Holes

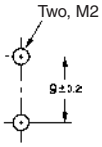


(Receiver)



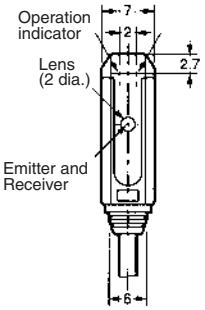


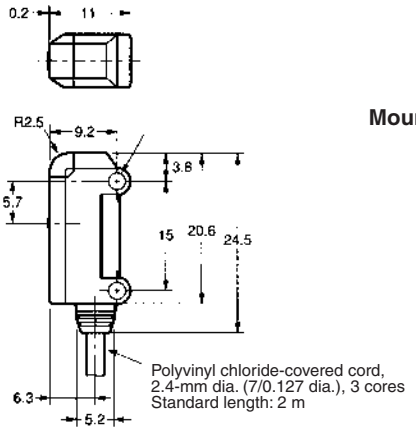
Mounting Holes



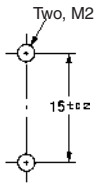
Retroreflective Models (Side-view Type)

E3T-SR1□



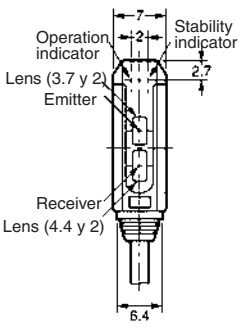


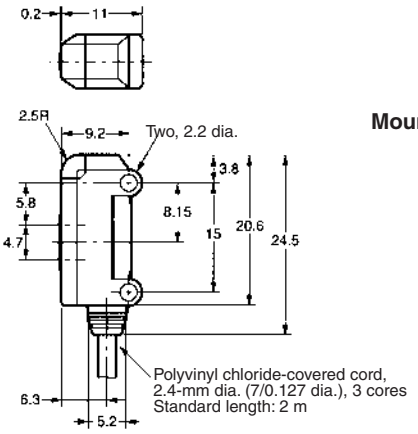
Mounting Holes



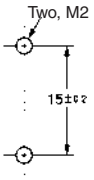
Limited Reflective Models (Side-view Type)

E3T-SL1□
E3T-SL2□



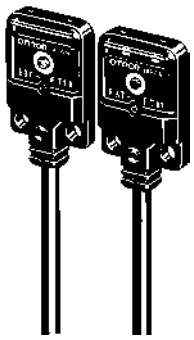


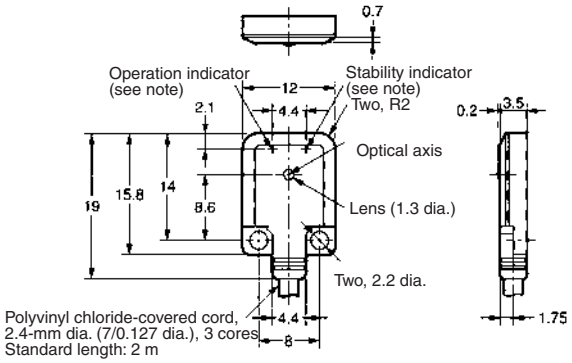
Mounting Holes



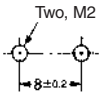
Through-beam Models (Flat Type)

E3T-FT1□
(Emitter, Receiver)





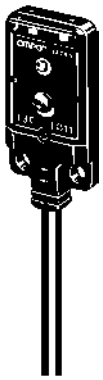
Mounting Holes

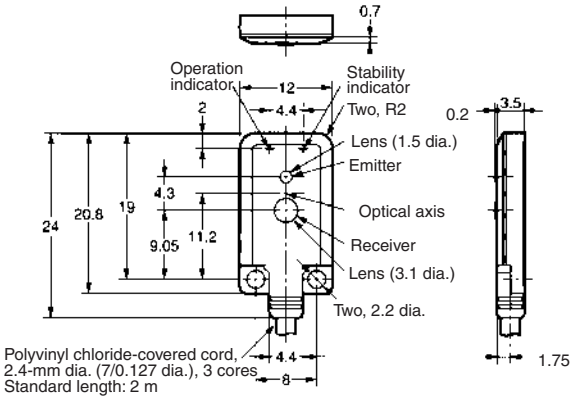


Note: For E3T-FT11/-FT13 and E3T-FT12/-FT14 Receivers only.

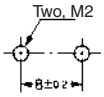
Diffuse Reflective Models (Flat Type)

E3T-FD1□





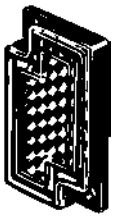
Mounting Holes



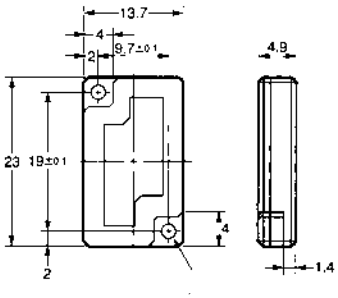
Accessories

Reflector (Attached to Retroreflective Models)

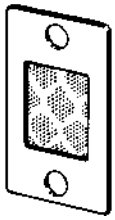
E39-R4



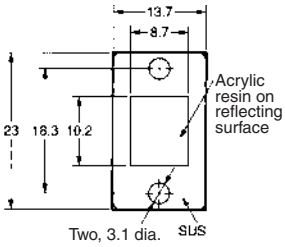
Material
Surface: Acryl
Back: ABS



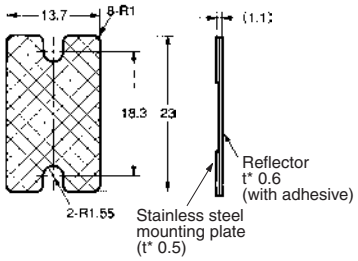
E39-R37



Mounting Plate



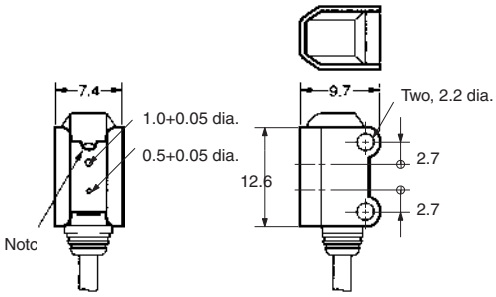
Reflector



Note: A reflector and a stainless steel mounting plate are supplied together as a set.

Slits (Order Separately)

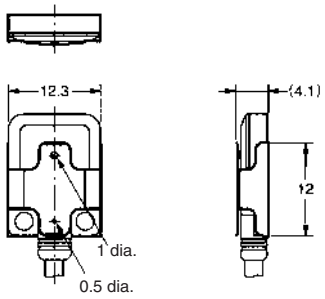
Through-beam E3T-ST1□ with E39-S63
With Slit mounted



Note: Align the notch direc tion of the Slit when installing on the Emitter and Receiver.

Material: 0.2-mm-thick stainless steel (SUS301)

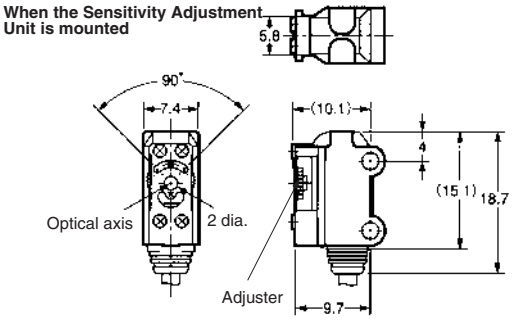
E39-S64 (for Through-beam E3T-FT1□)
With Slit mounted



Material: 0.2-mm-thick stainless steel (SUS301)

Sensitivity Adjustment Unit (for E3T-ST1□)

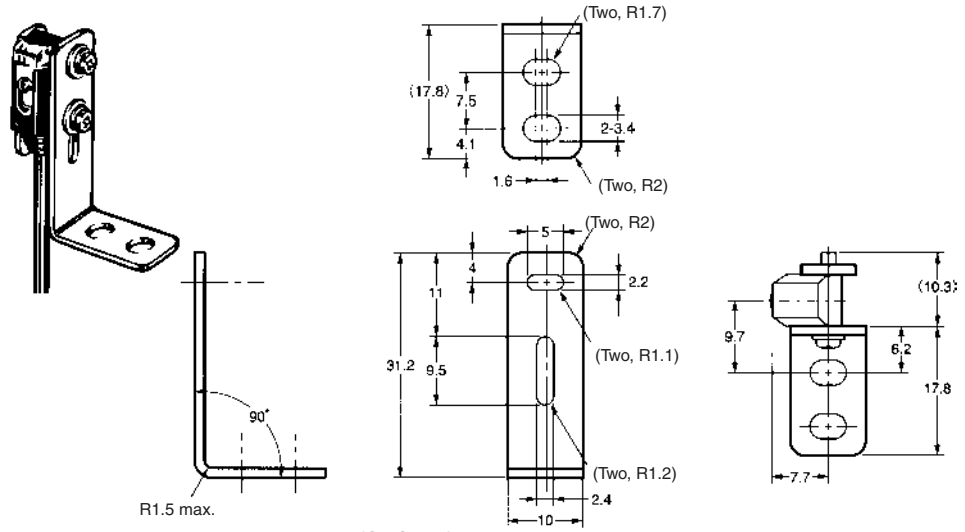
E39-E10



Material: Stainless steel (SUS301)

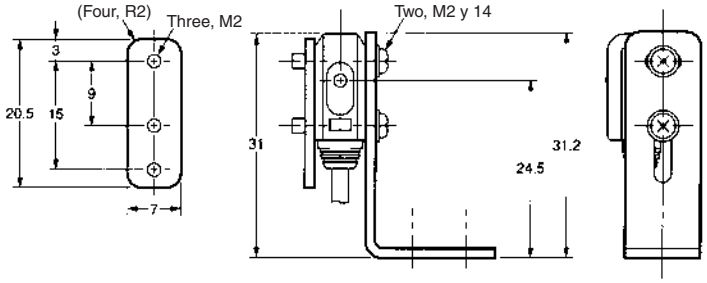
Mounting Brackets for E3T-S□ (Order Separately)

E39-L116

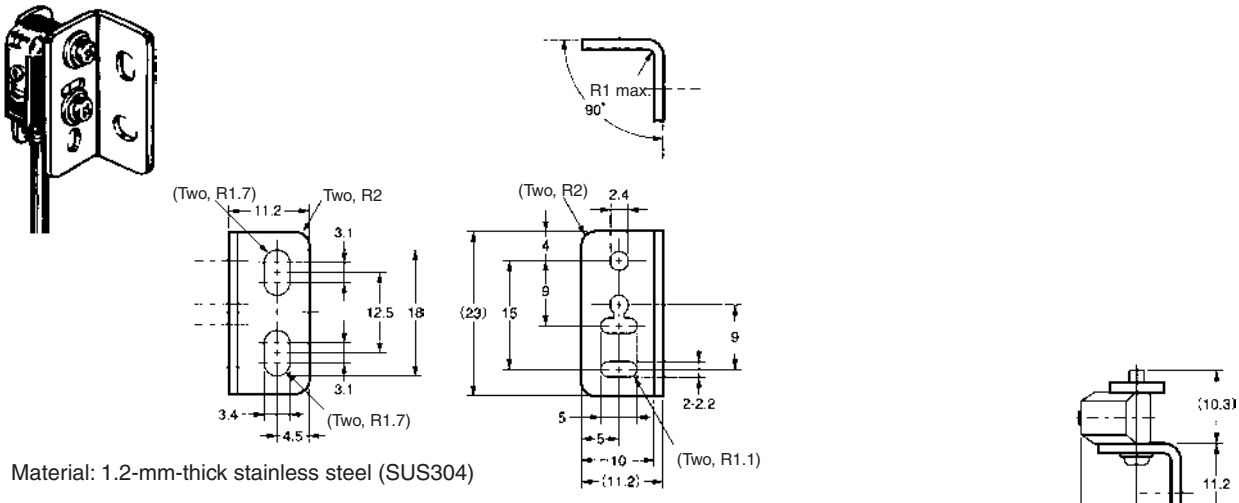


Material: 1.2-mm-thick stainless steel (SUS304)

E3T-ST11 with E39-L116

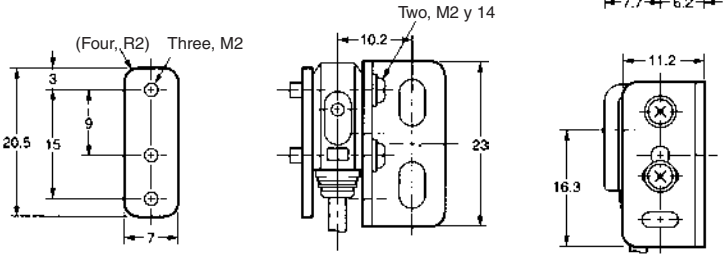


E39-L117

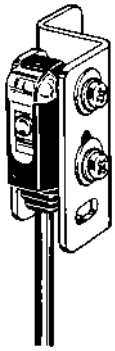


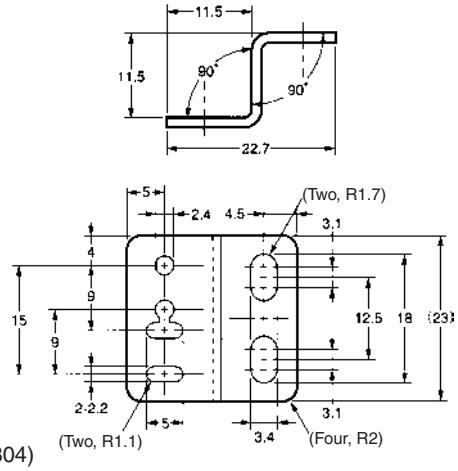
Material: 1.2-mm-thick stainless steel (SUS304)

E3T-ST11 with E39-L117



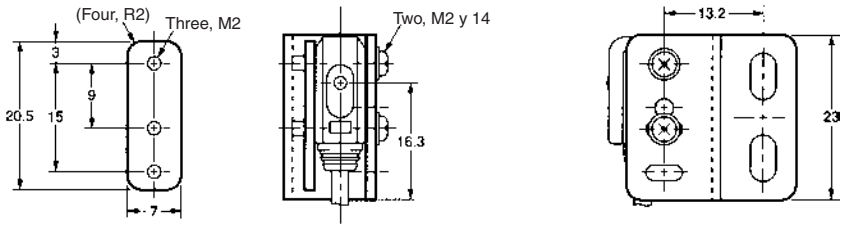
E39-L118





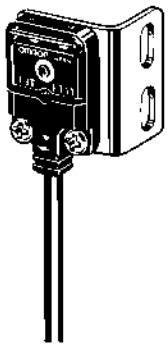
Material: 1.2-mm-thick stainless steel (SUS304)

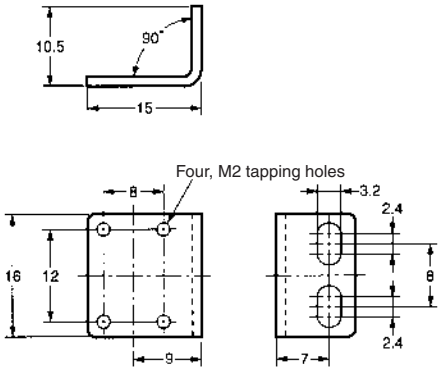
E3T-ST11 with E39-L118



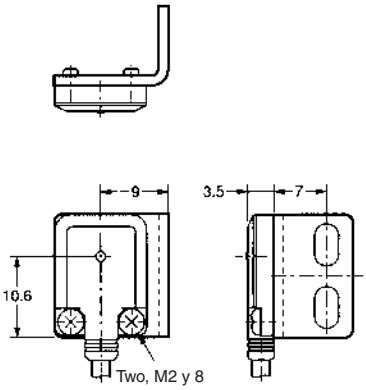
Mounting Brackets for E3T-FT1□/E3T-FD1□

E39-L119



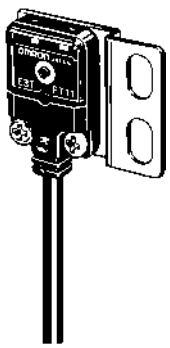


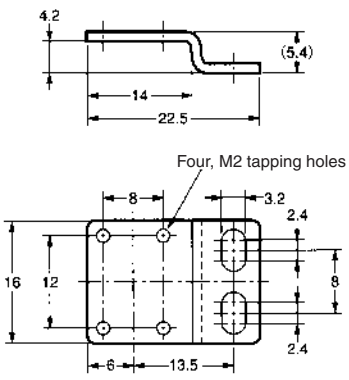
E3T-FT11 with E39-L119



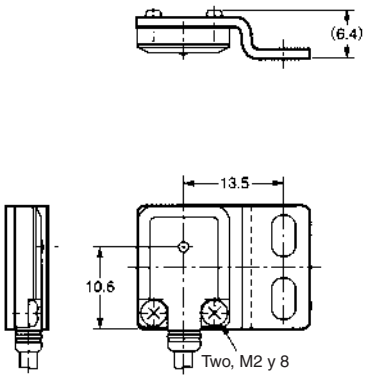
Material: 1.2-mm-thick stainless steel (SUS304)

E39-L120





E3T-FT11 with E39-L120



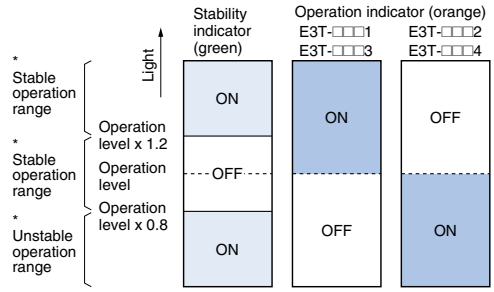
Material: 1.2-mm-thick stainless steel (SUS304)

Precautions

For adjustment

Display

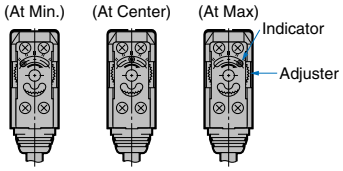
- The following graphs indicate the status of each operation level.
- Be sure to use the E3T within the stable operating range.



Note: If the E3T's operation level is set to the stable operation range, the E3T will be in most reliable operation without being influenced by temperature change, voltage fluctuation, dust, or setting change. If the operation level cannot be set to the stable operation range, pay attention to environmental changes while operating the E3T.

Use of E39-E10 Sensitivity Adjustment Unit

(Dark ON: E3T-ST12)



① Install the Unit on the Receiver.

② Set the adjustment dial of the sensitivity adjustment unit to Max. (Factory set to the Max. position)

③ After Sensor installation adjust the optical axis and secure the Sensor.

④ Place a work between the emitter and receiver, gradually turn the adjustment dial of the sensitivity unit to the Min position (CCW), and stop turning it when the operation indicator is turned ON and the stability indicator (green) is turned ON.

⑤ Remove the work and confirm that the operation indicator is turned OFF and the stability indicator (green) is turned ON. This completes the adjustment.

Note: If the light attenuation rate due to a work is 40% or less, the stability indicator is not turned ON whether or not light is received. When the variation of light is small (e.g. when sensing semi-transparent works), carefully perform preliminary testing.

Others

Do not install the E3T in the following places.

- Places where the E3T is exposed to direct sunlight.
- Places with high humidity and where condensation may result.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

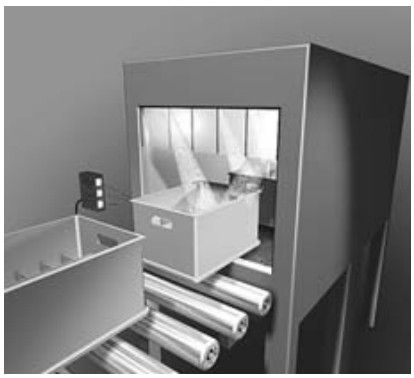
Cat. No. E12E-EN-01

Harsh environment long distance photoelectric Sensor in metal housing

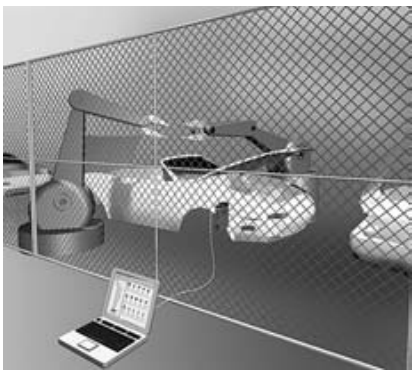
E3NT

- 4 Diffuse reflective E3NT-L application optimized models:
  - Extra long distance type for setting distances up to 3 m
  - Window heating type for low temperature environments
  - Analog output type for distance information
  - Fast response type for high speed detection and counting
- Retro reflective E3NT-R models with sensing distance up to 16 m
- Two programmable outputs for 'window teaching'
- Double triangulation for stable detection of reflective objects
- IP67 and IP69k for highest resistance in wet environments

Application



Condensation in often cleaned environments or due to rapid temperature changes is prevented by the completely sealed housing of the E3NT and the optional window heating.

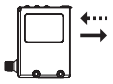
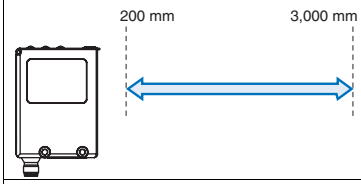
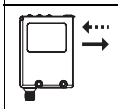
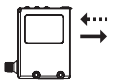
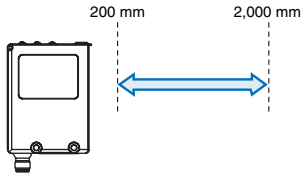
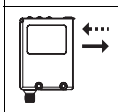
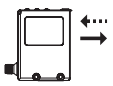
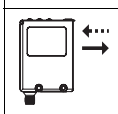
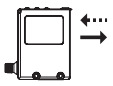
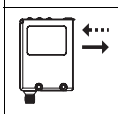
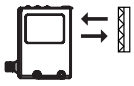
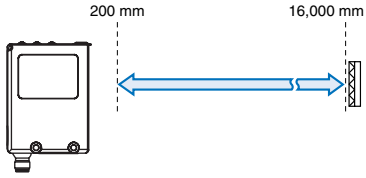
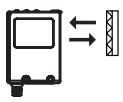


With the optic link, the sensor can be remotely set and checked while it is operating in an area where access is restricted.

This robust sensor is ideal for operation in harshest environments.

Ordering Information

Sensors

Sensing method	Type	Appearance	Connection method	Sensing / Setting distance	Model
Distance setting (BGS/FGS)	Long distance		M12 Connector (5-pole)	0.2 m .. 3.0 m (90% remission) 0.2 m .. 2.7 m (6% remission) 	E3NT-L17-20
					E3NT-L37-20
	Window heating			0.2 m .. 2.0 m 	E3NT-LH17
					E3NT-LH37
	Fast response				E3NT-L17
					E3NT-L37
	Analog and digital output				E3NT-L27
					E3NT-L47
Retro reflective (with MSR-polarisation)	Long distance			0.2 m .. 16.0 m (with E39-R8) 	E3NT-R17
					E3NT-R37

Accessories (order separately)

Optical data link

Communication method to sensor	Appearance	Communication method to PC	Model
IR data interface		RS232	E3NT-AL232 2M

Laser alignment aid

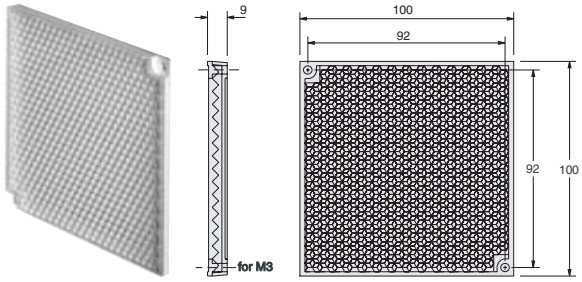
Max. distance for visible spot	Appearance	Operation time	Model
50 m		min. 5 hours with new battery	E3NT-AP1

Mounting brackets

Appearance	Model	Qty.	Remarks
	E39-EL1	1	Universal mounting bracket
	E39-EL2	1	Adapter bracket (for use of the universal mounting bracket for not matching holes)
	E39-EL3	1	Adapter bracket replacing E3N with E3NT

Reflectors

E39-R8



Sensor I/O connectors

Size	Cable type	Shape	Cable length	Model
M12	Standard 5-pole	Straight 	2m	XS2F-D521-DG0-A
			5m	XS2F-D521-GG0-A
		L-shape 	2m	XS2F-D522-DG0-A
			5m	XS2F-D522-GG0-A
	Standard 4-pole (Pin 5 not connected)	Straight 	2m	934 401 101 (PVC)
				934 401 201 (PUR)
			5m	934 401 100 (PVC)
				934 401 200 (PUR)
		L-shape 	2m	934 402 102 (PVC)
				934 402 201 (PUR)
			5m	934 402 100 (PVC)
				934 402 200 (PUR)

Rating/performance

Sensors

Item	Model				
	E3NT-L17 E3NT-L37	E3NT-L27 E3NT-L47	E3NT-LH17 E3NT-LH37	E3NT-L□7-20	E3NT-R
Sensor type	Diffuse reflective sensor with background suppression respectively foreground suppression				Retroreflective sensor
Signal evaluation	Double triangulation method				Polarization
Configuration	By push button on the sensor or with a PC connected via the optical data link E3NT-AL232 2m				
Operating modes	Background suppression, foreground suppression, background and foreground suppression (2-point window evaluation)				---
Light source	Infrared LED 850 - 880 nm				Red LED 660 nm
Rated sensing distance	2 m			3 m	16 m
Setting distance Sr	Distance – setting possible between				---
	0.2 ... 2.0 m (90 % remission) 0.2 ...1.7 m (6 % remission)		0.2 ... 2.0 m (90 % remission) 0.2 ...1.4 m (6 % remission)	0.2 ... 3.0 m (90 % remission) 0.2 ...2.7 m (6% remission)	0.2 ... 16.0 m
Standard measured object	Kodak gray card 90% (white), size: 200 x 200 mm				---
Blind zone	< 0.1 m				< 0.15 m
Black/white error (6%/90%)	< 15 % of setting distance Sr				---
Hysteresis (typical)	< 5 % of setting distance Sr or 4 cm (for white 90 %) < 10 % of setting distance Sr or 6 cm (for black 6 %)			< 10 % of setting distance Sr or 10 cm (for white) < 15 % of setting distance Sr or 10 cm (for black)	---
Repetition accuracy	< 5 % (of setting distance Sr) or 4 cm			< 5 % (of setting distance Sr) or 10 cm	---
Light spot diameter	< 40 mm in the case of Sr = 2 m				app. 100 mm[*1] at 10 m
Minimum object size	> 40 mm				
Ambient light immunity to EN 60947-5-2:	Halogen lamps (100-120 Hz > 10,000 lux Fluorescent lamps (30 kHz) > 5,000 lux Energy saving lamps > 2,000 lux				
Utilization category to EN 60947-5-2	DC 12				
Rated operating voltage	+ 24 V DC, polarized				
Operating voltage range	+ 10 ... + 30 V DC			+ 11 ... + 30 V DC	+ 10 ... + 30 V DC
Current consumption	< 90 mA (display off) < 110 mA (display on)	< 100 mA (display off) < 120 mA (display on)	< 220 mA with front pane heating	< 110 mA (display off) < 130 mA (display on)	< 80 mA (display off) < 110 mA (display on)
Power-on delay	< 300 ms				
Input – / Output – pins	Pin 2 = Input (In 2) or output (Out 2), depending on configuration Pin 4 = Output (Out 1)				
	Pin 5 = Input (In 1)	Pin 5 = Analog output	Pin 5 = Input (In 1)		
Digital Outputs	User set functions (e.g. switching output, alarm output, ...)				
Output circuit	User set PNP (open collector), NPN (open collector) or complementary (push-pull)				
Output current	max. 100 mA				
Voltage drop	< 2.0 V				
Residual current	< 100 µA				
Circuit protection	Reversed power supply, overload, short-circuit (pulsed)				

Item		Model				
		E3NT-L17 E3NT-L37	E3NT-L27 E3NT-L47	E3NT-LH17 E3NT-LH37	E3NT-L□7-20	E3NT-R
Inputs		User set functions (e.g. teach-in, trigger, test, ...)				
	Input circuit	Voltage input +10 V ... U_{supply}			Voltage input +11 V ... U_{supply}	Voltage input +10 V ... U_{supply}
	Input pulse duration	min. 1 ms				
Analog Output			Current output 3..21mA: • 3 mA correspond to distance < 0.2 m • 4 ... 20 mA correspond to distance 0.2 m ... 2.0 m • 21 mA correspond to distance > 2.0 m (or no object)			
Switch-on/off time (T_{ON} / T_{OFF})		≤2.5 ms	≤5 ms	≤2.5 ms	≤20 ms	≤2.0 ms
Insulation resistance		20 MΩ at 500 V DC				
Insulation voltage strength		1,0 kV AC, 50/60 Hz (1 min)				
Impulse strength (insulation)		1,5 kV				
Dimensions (length x width x depth)		85 x 27 x 65 mm				
Materials						
	Housing	Powder-coated aluminum, sea-water resistant, 231 GD AlSi12 (Cu) (standard version)				
	Front pane	Glass				
	Keyboard	HTV silicone				
	Seals	RTV silicone				
Housing color		Grey, RAL 7030				
Assembly		Screw fastening by way of four M5 threads and two M5 through holes or with universal mounting bracket (order separately)				
Connection		M12 connector, 5-pole (piercing)				
Ambient temperature range		- 25 °C ... + 55 °C	- 10 °C ... + 55 °C (analog output)	- 40 °C ... + 55 °C	- 25 °C ... + 55 °C	
Storage temperature range		- 40 °C ... + 60 °C			- 40 °C ... + 70 °C	
Permissible relative humidity		35 % ... 95 %, no condensation				
Enclosure rating		IP 67 (EN 60529), IP 69k (DIN 40050)				
Protection class		II (50 V DC)				
Vibration resistance		± 1.5 mm, 1 h , 10 - 70 Hz (IEC 68-2-6)				
Shock resistance		300 m/s² (IEC 68-2-27)				
User set parameters		- Mode - Output function - Teach/set switching points - Output switching - Function on connector pin 2 and 5 - Switch-on and off delay - Type of switch-off time function - Type of display on the sensor - Keyboard lock - Energy saving mode - Display direction - Reset to factory defaults				

*1. see diagramm

Accessories

E3NT-AL 232 2 M

Item	
Dimensions (length x width x depth)	29.5 x 72.9 x 26.4 mm
Housing material	ABS and PMMA (IR transparent)
Housing colour	Black, RAL 9005
Assembly	Snap mounting on sensor
Connection	2 m connecting cable with 9-pole sub-D connector
Ambient temperature range	- 10 °C ... + 50 °C
Storage temperature range	- 40 °C ... + 60 °C
Permission relative humidity	35% ... 85%, no condensation
Degreee of protection to EN 60529 / IEC 529	IP 54
Emitted light	IR communication element 880 nm
Rated operating voltage	Via RS 232 interface from PC
Current consumption	6 mA

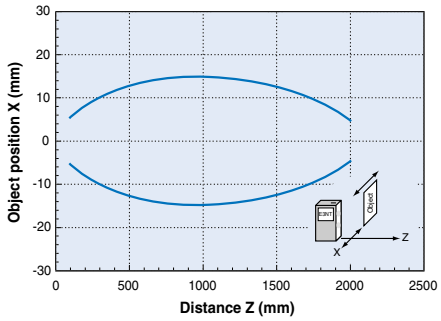
E3NT-AP1

Item	
Supply voltage	3 V DC
Battery type	Button battery Ø 11.6 mm, thickness: 5.4 mm, 3 Vm, type: CR1/3N
Ambient temperature range	+ 10 °C ... + 40 °C
Storage temperature range	- 40 °C ... + 60 °C (with no icing or condensation)
Ambient humidity	Operation and storage: 35% ... 85% (with no icing or condensation)
Ambient environment	No corrosive gases
Operation time period	min. 5 hours operation with 1 new battery
Degree of protection	IP20 (EN 60529)
Case material	Case: ABS/PC Base plate: Aluminium
Weight	Approx. 42 g
Accessories:	1 Instruction sheet, 1 battery type CR1/3N
Max. distance for a visible beam spot	about 50 m (depending on the ambient light and surface conditions)
Laser beam power	< 1 mW
Laser class	Laser Class II

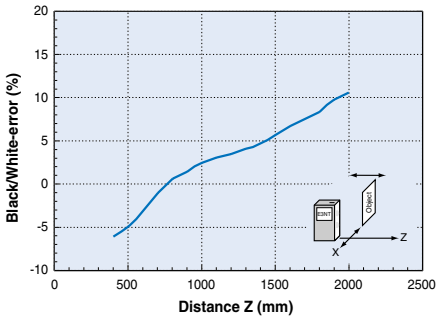
Characteristic data (typical)

E3NT-L17/L37 and E3NT-LH17/LH37

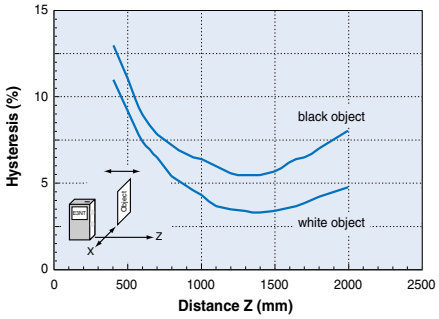
Operating range
(90% remission)



Black/White - Error
(6% - 90% remission)

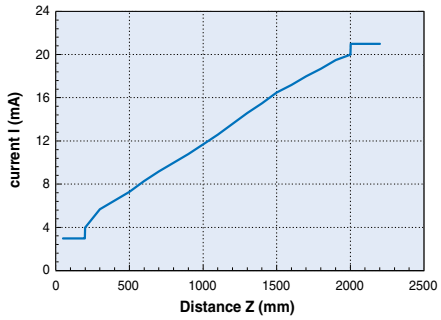


Hysteresis



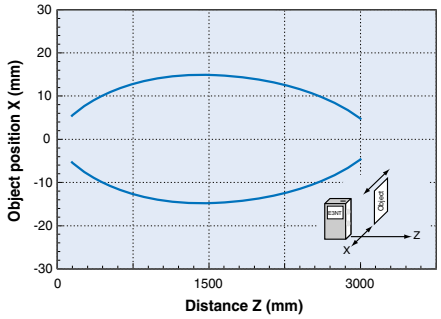
E3NT-L27/L47

Analog output current
(90% remission)

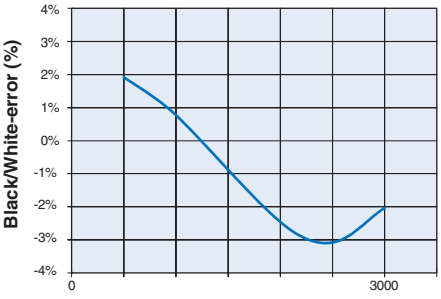


E3NT-L17-20 and E3NT-L37-20

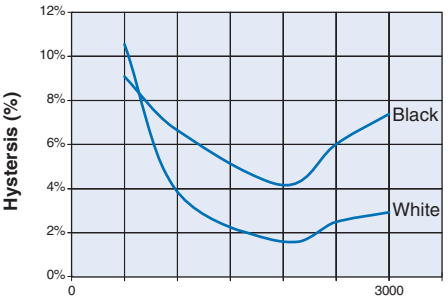
Parallel Operating range



Black/White - Error
(6% - 90% remission, typical)

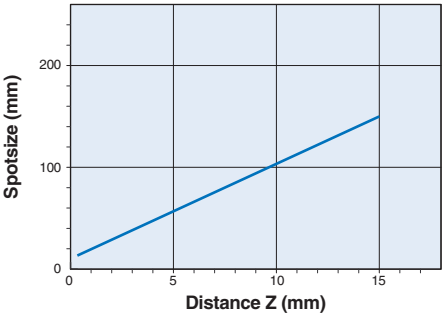


Hysteresis (typical)



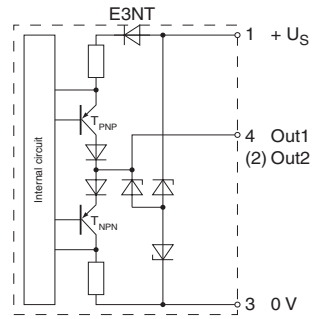
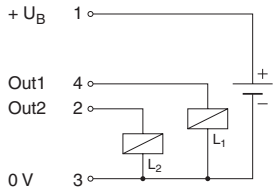
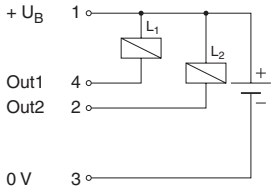
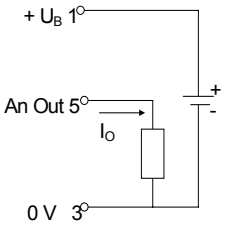
E3NT-R

Spotsize



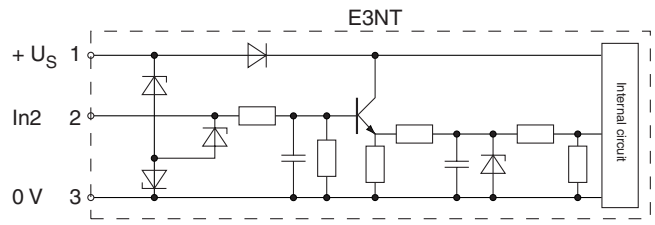
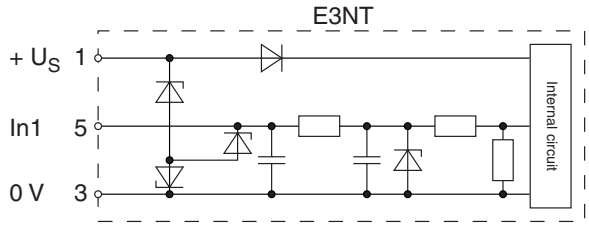
Circuit diagram

Output

Push-pull output circuit (Out1 at pin 4 / Out2 at pin 2)	Load connection		
	PNP	NPN	Analog
			

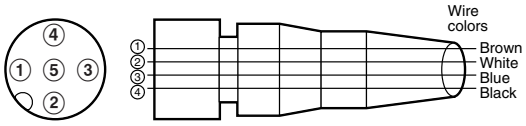
When use is made of the PNP or NPN output circuit, the output circuit that is not selected is deactivated. When used as a complementary output, NPN or PNP outputs act in antiphase as the switch state changes.

Input

In2 at pin 2	In1 at pin 5 (not available for analogue output models)
	

The sensor inputs are realised in positive logic and detect a positive voltage level of more than 1 ms duration as a valid signal if the voltage level is between 10 V and the power supply voltage.

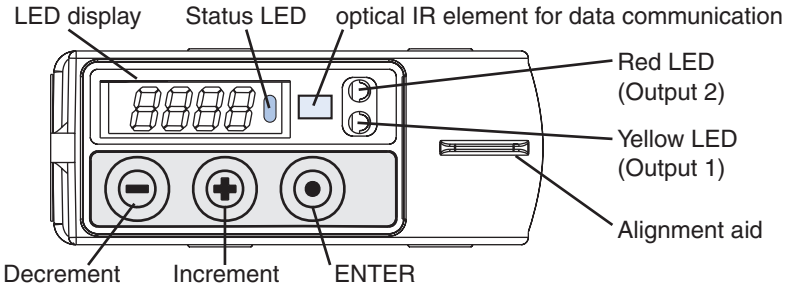
Connectors



Class	Wire jacket color	Connector pin no.	Application
For DC	Brown	1	Power supply (+V)
	White	2	Output or Input Out2 / In2
	Blue	3	Power supply (0V)
	Black	4	Output Out1
	Grey	5*	Analog Output or Input In1

* Not connected for standard 4-pole connectors

Nomenclature



LED display	The distance from the measured object and the names of the menu levels during set-up of the sensor are displayed by the 4-digit 7-segment LED display. The display appears as red digits or letters. If the sensor is set to a bar chart display, the distance from the measured object is displayed as a green LED bar chart.		
LED	The switching status and the stability of the two outputs are signalled as follows by two LEDs, visible from the top and the front of the sensor:		
	Yellow LED (Output 1)	ON	Object stably detected
		Blinking	Object not stable detected
		OFF	No object within range
	Red LED (Output 2)	ON	Object stably detected
		Blinking	Object not stable detected
		OFF	No object within range
	Status LED	ON	Set-up menu selected
		Blinking	Menu level with change of setting distance
		OFF	RUN (normal) mode

Operation

Setting the switching points

The switching points can either be user set (Teach-in mode) with a measured object positioned at the corresponding distance or can be set using the setting input, for remote setting. For each output of the sensor (up to two), up to two switching points can be user set.

Only one switching point is active in the foreground and background suppression modes.

For the 2-point window evaluation mode, two switching points must be set.

Teaching the switching points in the normal mode

The sensor is set at the factory for both outputs to **BGS**, light on.

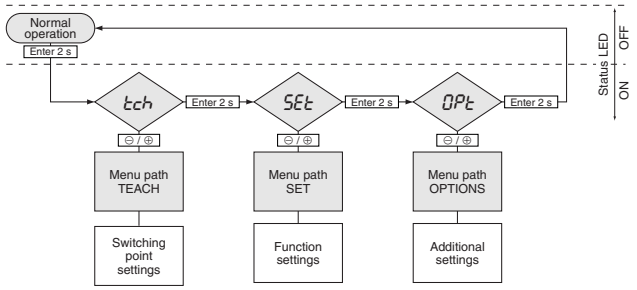
1. Place the target object in front of the sensor at the desired position.
2. Teach the switching point for output 1:

- Beginning with the ⊕ key, press it simultaneously with the ENTER ⊙ key. Threshold level is obtained and the output/LED is updated. Status LED is blinking.
- Using the ⊕/⊖ keys an adjustment of the switching point is possible. The output/LED is updated immediately.
- Pressing the ENTER ⊙ key for more than 2 seconds or after 2 minutes without any activation of the keys, the sensor returns to normal operation. The status LED is turned off.

3. Teach the switching point for Output 2:

- Beginning with the ⊖ key, press it simultaneously with the ENTER ⊙ key.

Main menu structure



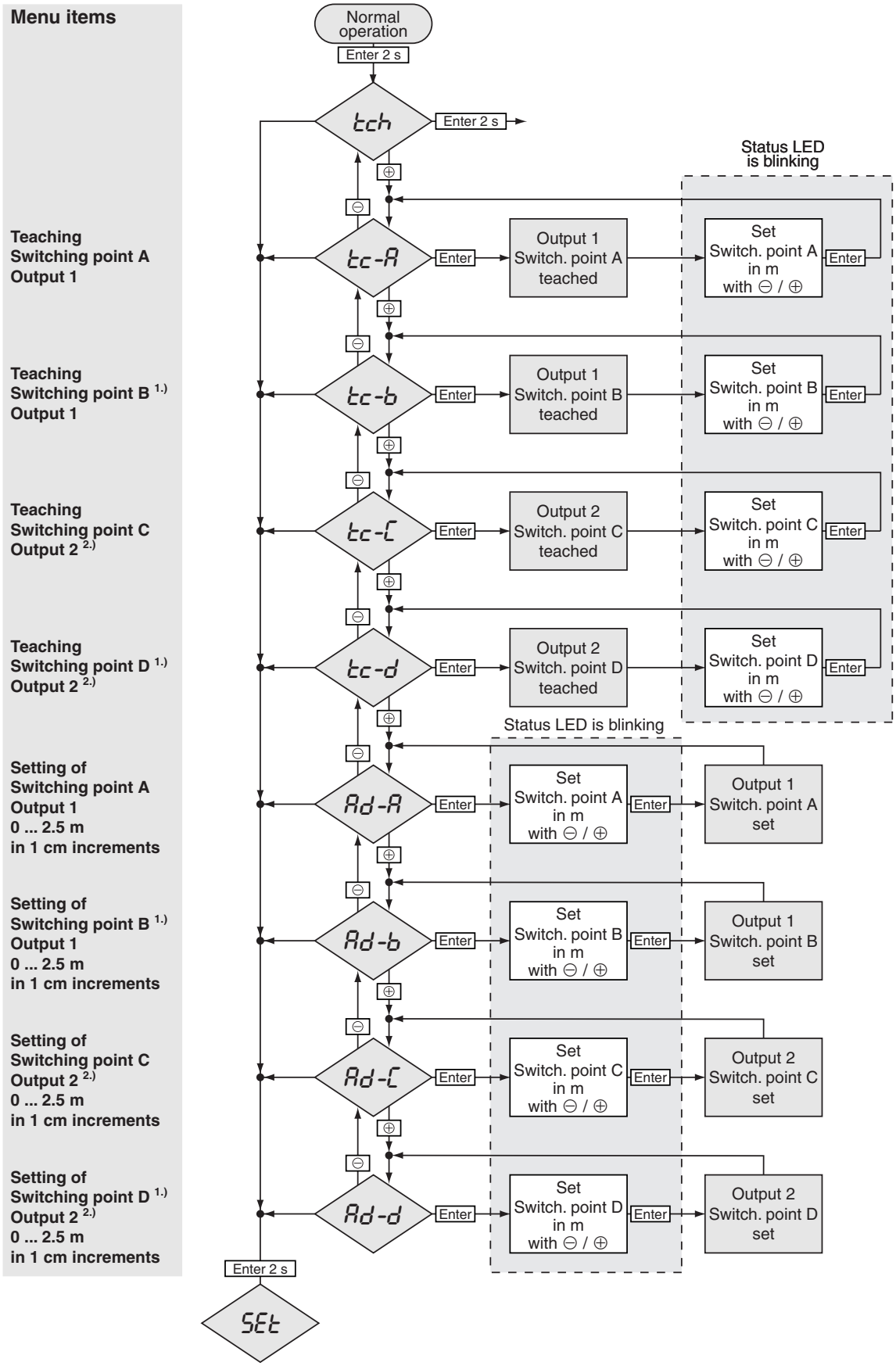
When the ENTER ⊙ key is pressed for 2 seconds, the sensor switches from the normal mode to the TEACH menu path. The sensor switches to each next menu path when the ENTER ⊙ key is repeatedly pressed for 2 seconds. In the menu paths, the required parameters can be selected by pressing ⊖ and ⊕ keys.

ℹ To skip a menu path, you can also press the ENTER key for 4 seconds.

ℹ [ENTER] Press the ENTER ⊙ key < 1 second

ℹ [ENTER 2s] Press the ENTER ⊙ key > 2 seconds.

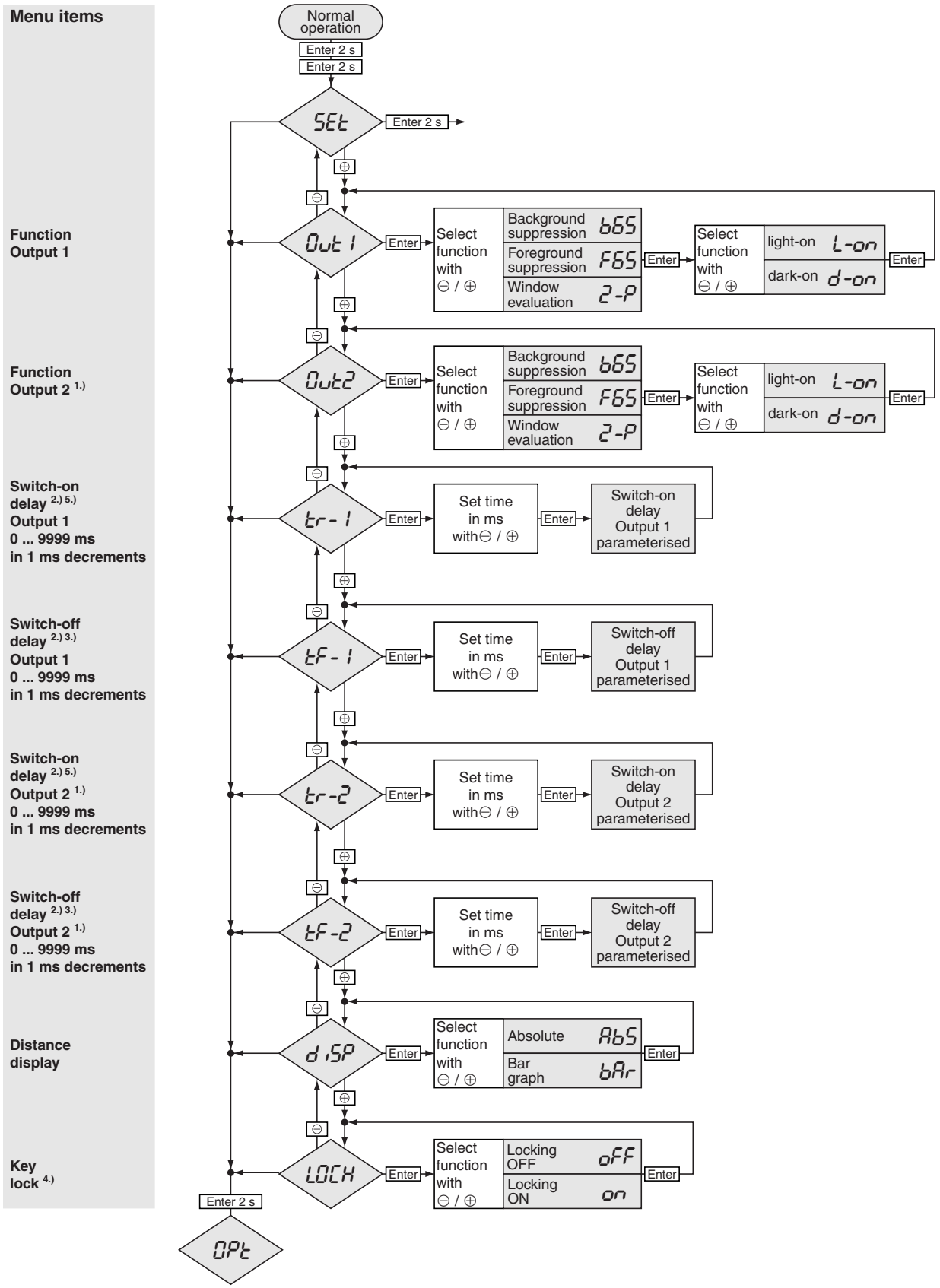
TEACH menu



1.) In the 2-point window evaluation mode, two switching points (A/B and C/D) can be set for each output. In the foreground and background suppression modes, only one switching point (A and C) can be set for each output. Then, only these switching points, A and C, can be set in the TEACH menu path. B and D switching points are not available.

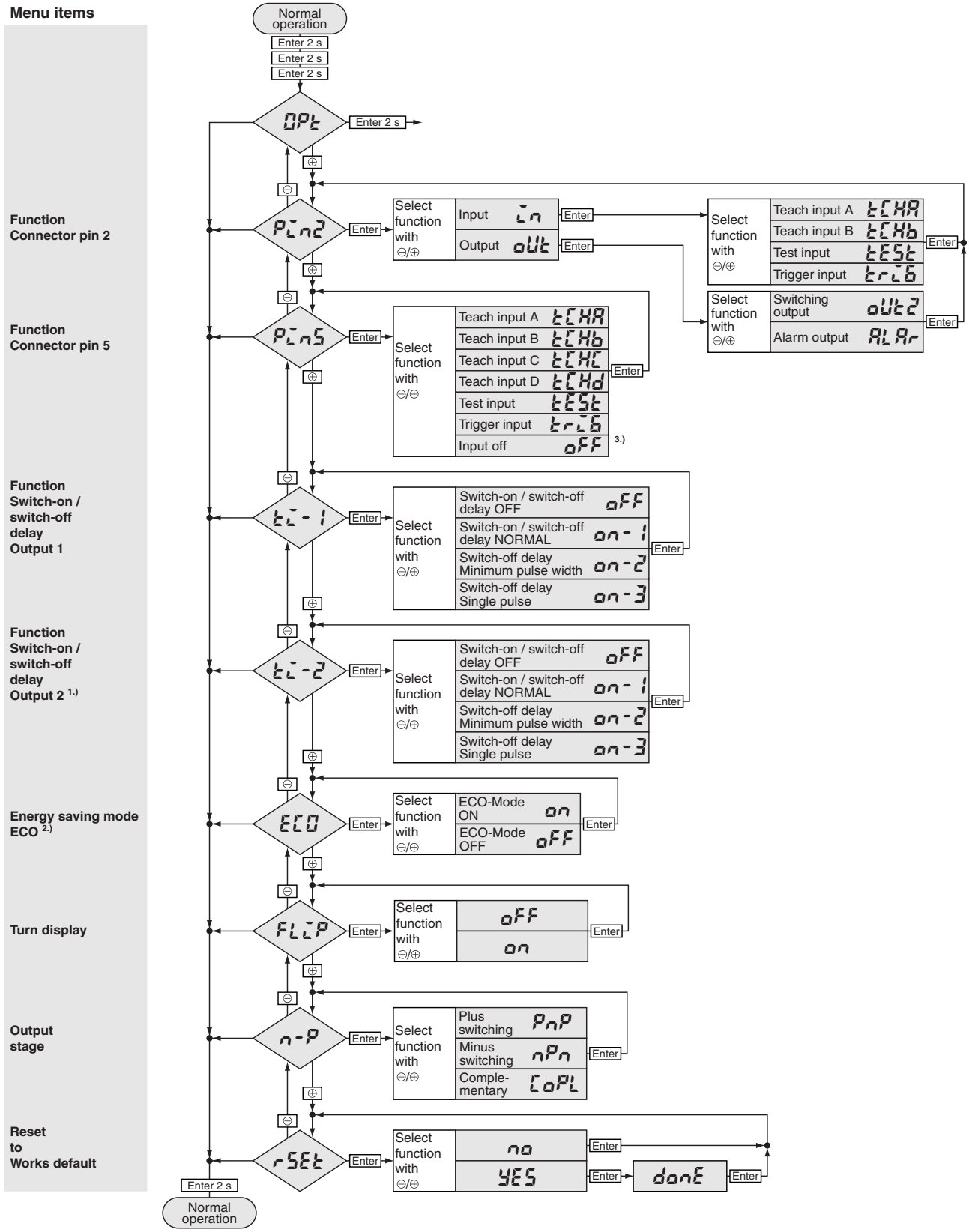
2.) If connector pin 2 is set as an input, only the switching points for Output 1 can be set.

SET menu



1.) If connector pin 2 is set as an input, the switch-on/off delay function canonly be set for Output 1. A second switching output is not available.
2.) If the switch-on/off delay is off in the OPTIONS menu path, the switch-on/off delay parameters do not appear in the SET menu path.
3.) The outputs behave differently depending on the switch-off delay functionthat is set in the OPTIONS menu path.
4.) The key lock becomes active again when no keys have been pressed for approx. 5 minutes.
The key lock can be temporarily cancelled by pressing the ⊕ and ⊖ keys for 4 seconds.
5.) The On-delay-setting tr-1 or tr-2 are only available if the switch-on/off de-lay in the OPTIONS menu path is set to on-1.

OPTIONS menu



1.) If connector pin 2 is set as an input, the type of switch-on/off delay option can only be set for Output 1.
2.) If the ECO energy saving mode is on, the display is switched off if no keys are pressed for about 5 minutes. The display is switched on again when any key is pressed.
3.) Firmware 1.10 and higher

SET menu E3NT-R

Menu items

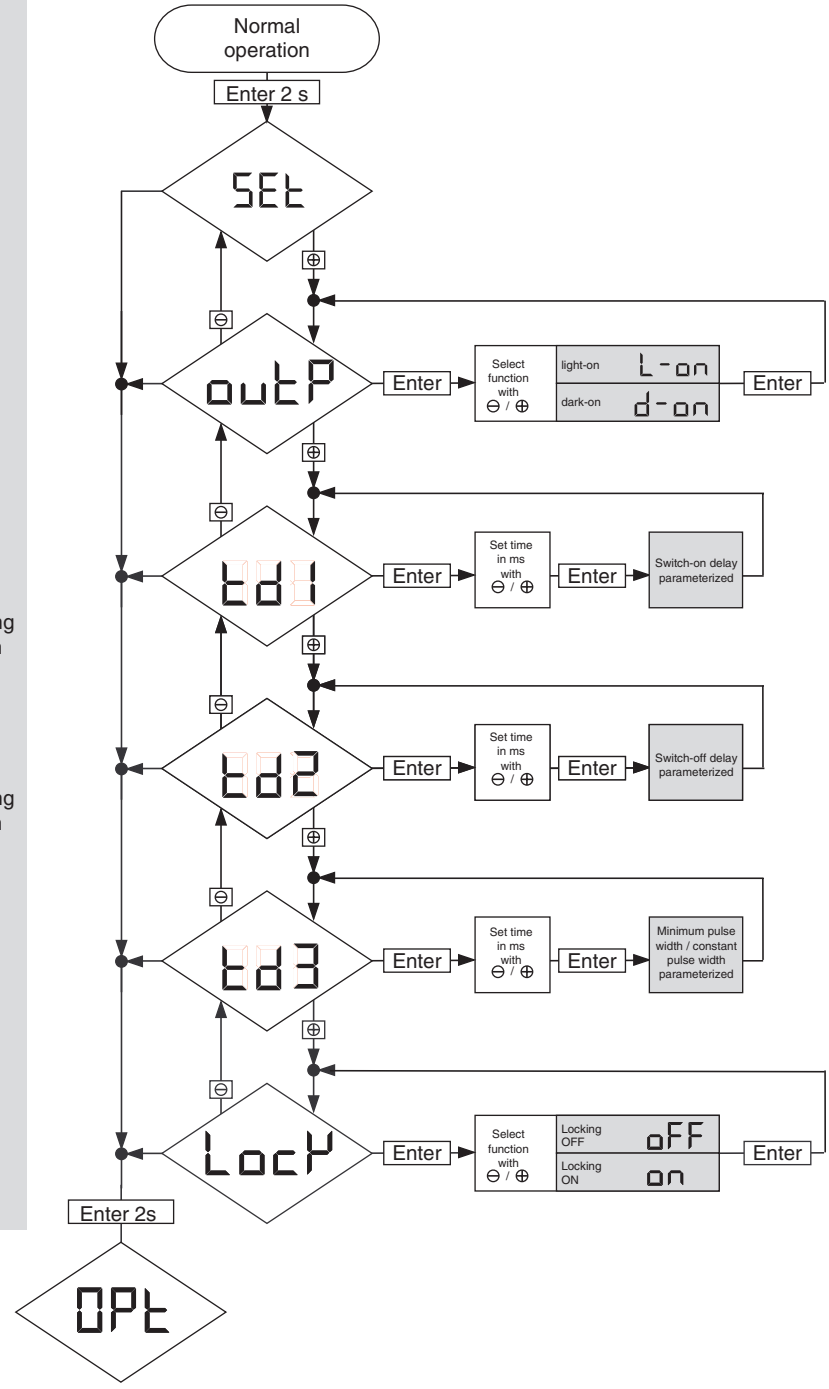
Function of switching output

Switch-on delay of switching output in ms (regarding to setting of delay function in OPT menu)

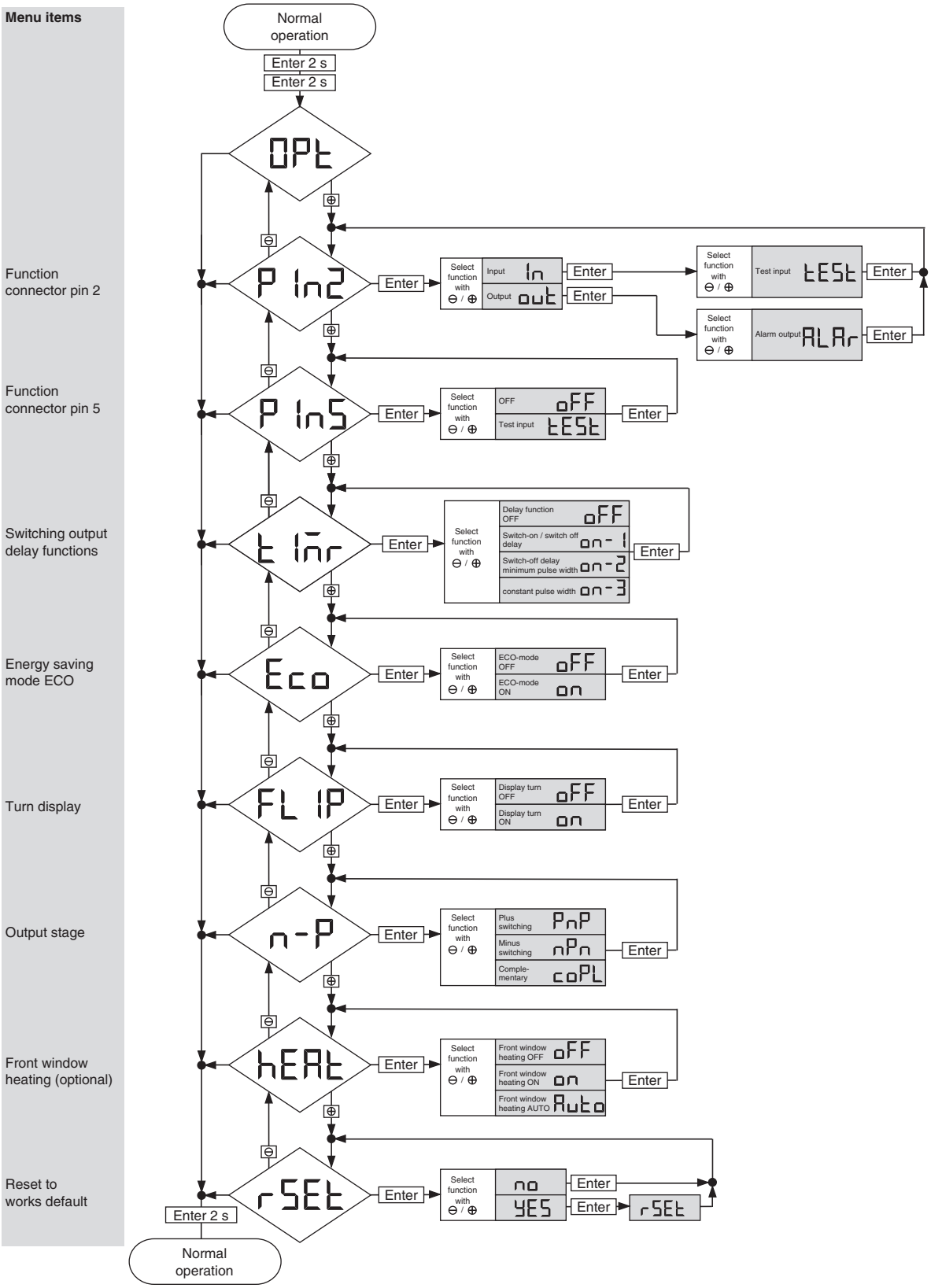
Switch-on delay of switching output in ms (regarding to setting of delay function in OPT menu)

minimum pulse width / constant pulse width of switching output in ms (regarding to setting of delay function in OPT menu)

Key lock



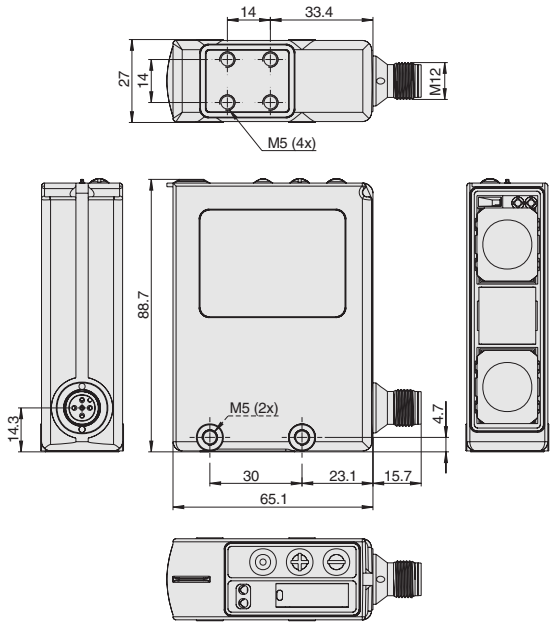
OPTIONS menu E3NT-R



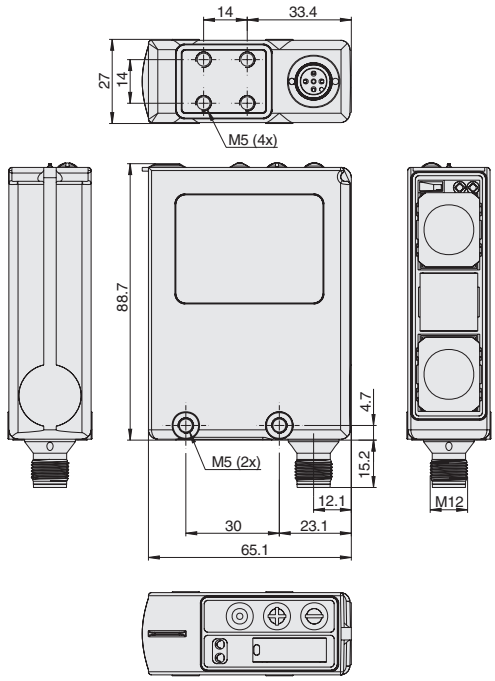
Dimensions

Sensors

E3NT-L17
E3NT-L27
E3NT-LH17



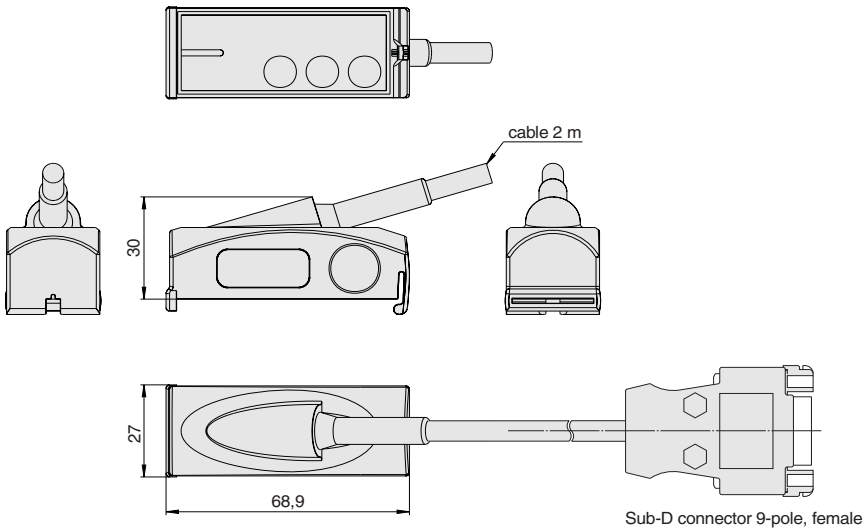
E3NT-L37
E3NT-L47
E3NT-LH37



Accessoires (order separately)

Optical data link

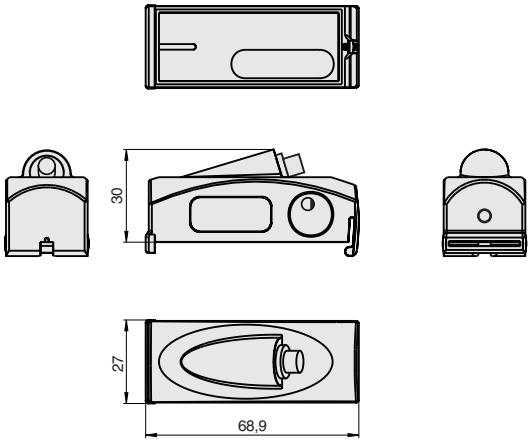
E3NT-AL232 2m



Sub-D connector 9-pole, female

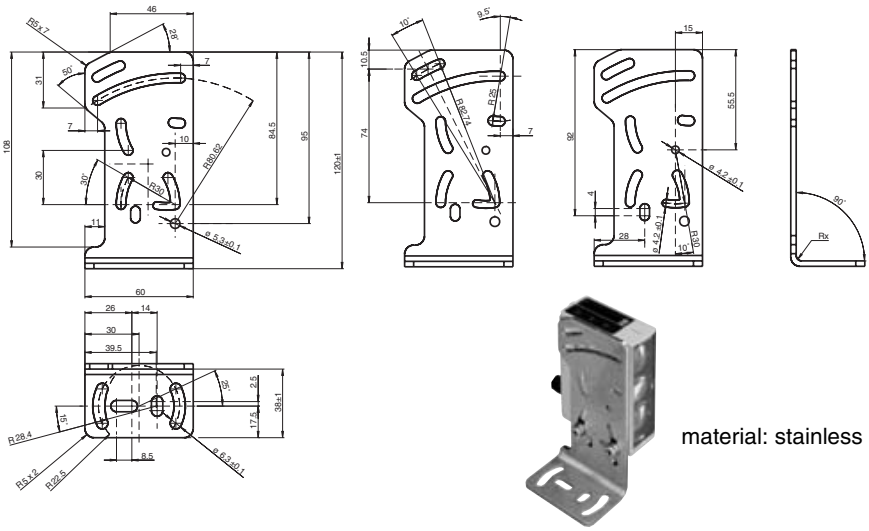
Laser alignment aid

E3NT-AP1



Universal mounting bracket

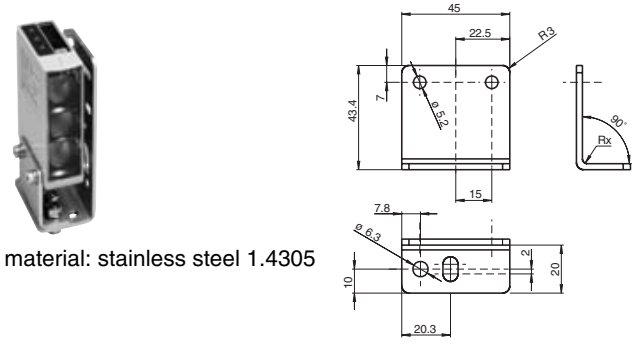
E39-EL1



material: stainless steel 1.4305

Adapter bracket

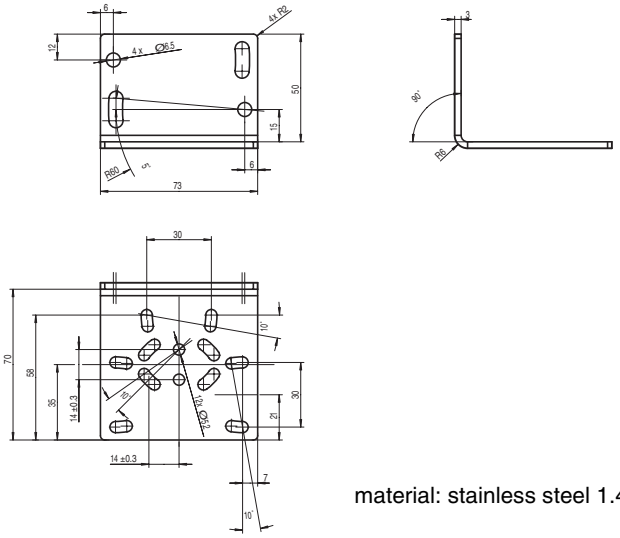
E39-EL2



material: stainless steel 1.4305

Replacement bracket for E3N with E3NT

E39-EL3



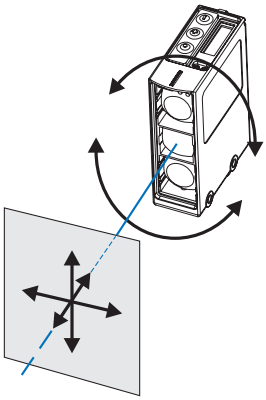
material: stainless steel 1.4305

Precautions

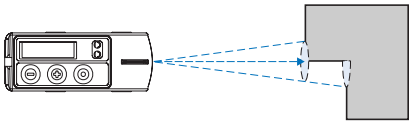
Mounting Directions

Sensor assembly

Contrary to sensors with single triangulation, E3NT with double triangulation, allows the measured object's direction of motion to be in all three directions. Thus, the rotatory position of the sensor about its optical axis can be chosen freely.



If the light spot is not completely on the same plane as the target object (minimum object size) the distance is not determined and malfunction can occur. If necessary a trigger signal or timer function has to be applied.

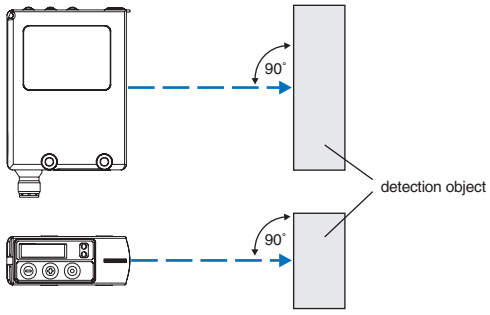


The sensor must be fitted so that:

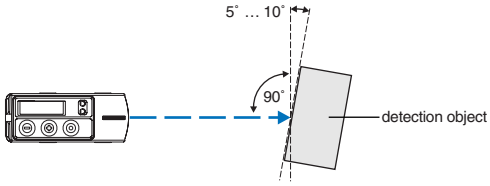
- It is correctly aligned before it is adjusted
- It is protected as far as possible against vibration and shock
- It is protected as far as possible against extraneous incident light
- It is protected as far as possible against damage and soiling
- Electrical connection is possible
- It is as accessible as far as possible for maintenance work
- Operation of the push buttons is possible
- The display is visible.

Sensor's assembly direction

As far as possible, the sensor's optical surface should be aligned parallel to the surface of the measured object.



If the measured object has a glossy, reflecting surface, the sensor's optical system should be tilted by 5 … 10° in relation to the surface of the measured object.



If there is a reflecting surface in parallel with the sensor's optical axis, this might lead to unstable switching states.
Therefore, reflecting objects within the sensor's optical axis should be avoided.
If this should not be possible, the reflecting surface should not be parallel to the sensor's optical axis, but should be rotated by at least 10°.
Mirror-like objects can cause malfunction inside and outside the sensing range. Avoid mirror-like objects in or close to the optical axis.

Inspection and Maintenance

Cleaning

Do not use any scratching or abrasive cleaning materials. The protective pane of the optical system might get damaged.
The sensor requires no maintenance.
Remove dirt build up from the optical system and the display at regular intervals only with a soft, non abrasive fabric. Residual dirt may have influence on the switching point and display accuracy.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E332-E2-02

Oil-resistive, compact photoelectric sensor in metal housing

E3S-C

Features

Meets IP67/IP67G (oil tight) and NEMA 6P standards water/oil resistance

E3S-C meets the IP67 requirements of the IEC standards and 6P of the NEMA standards. E3S-C can be used worry-free in automotive assembly lines and other production lines where oil vapor exists. It can also be applied to food processing lines because it resists hydrogen peroxide, detergent and potassium hydroxide.

High shock resistance of 1,000 m/s^2

The industry's top-class photoelectric sensor features shock resistance of 1,000 m/s^2, which is as high as that of a proximity sensor at rated values, and vibration resistance of as high as 10 to 2,000 Hz.

Lineup of M12 metal connector joint type models

Lineup of water/oil/shock-resistant M12 metal connector joint type models are available. This series ensures ease of sensor replacement during maintenance.

NPN/PNP output selector

The operation panel has the NPN/PNP output selector. You need not prepare two NPN and PNP models for export. You need not worry about malfunctions due to noise, either.

Mutual interference prevention enhanced (Retroreflective, diffuse reflective models)

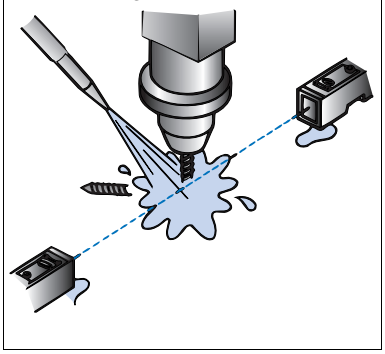
Fuzzy inference is introduced into the mutual interference prevention for the first time in the industry. This prevents a malfunction due to mutual interference, enabling two sensors to be mounted closely side by side.

Easy optical axis alignment

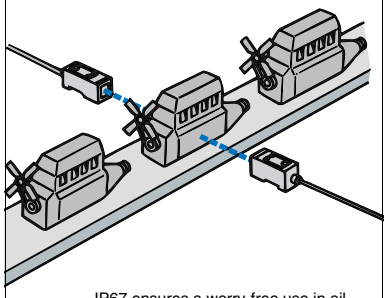
OMRON's original "automatic position compensation system" minimizes misalignment of mechanical and optical axes to merely ±2°. The optical axis is aligned perfectly by only installing the sensor.

Application

Drill breakage detection



Detection of engine block



IP67 ensures a worry-free use in oil mist environment.

Ordering Information

Sensors

Red light Infrared light

Sensor type	Shape	Connection method	Sensing distance	Model
Through-beam	Horizontal Model	Pre-wired	30m	E3S-CT11
		Junction connector		E3S-CT11-M1J
		Plug-in connector		E3S-CT16
	Vertical Model	Pre-wired		E3S-CT61
		Junction connector		E3S-CT61-M1J
		Plug-in connector		E3S-CT66
Retroreflective Models	Horizontal Model	Pre-wired	3m	E3S-CR11
		Junction connector		E3S-CR11-M1J
		Plug-in connector		E3S-CR16
	Vertical Model	Pre-wired		E3S-CR61
		Junction connector		E3S-CR61-M1J
		Plug-in connector		E3S-CR66
Diffuse-reflective	Horizontal Model	Pre-wired	700mm	E3S-CD11
			2m	E3S-CD12
		Junction connector	700mm	E3S-CD11-M1J
			2m	E3S-CD12-M1J
		Plug-in connector	700mm	E3S-CD16
			2m	E3S-CD17
	Vertical Model	Pre-wired	700mm	E3S-CD61
			2m	E3S-CD62
		Junction connector	700mm	E3S-CD61-M1J
			2m	E3S-CD62-M1J
		Plug-in connector	700mm	E3S-CD66
			2m	E3S-CD67

Accessories (Order Separately)

Slits

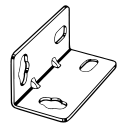
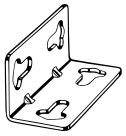
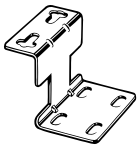
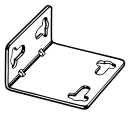
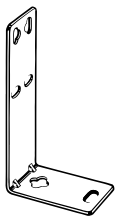
Slit width	Sensing distance	Minimum sensing object (typical)	Model	Quantity	Remarks
Width 0.5 mmx11 mm	1.8 m	0.5 mm dia.	E39-S61	1 each for emitter and receiver (total of 8 pcs.)	(Plug-in type long slit) Can be used with through-beam E3S-CT□1 (-M1J).
Width 1 mmx11 mm	3.5 m	1 mm dia.			
Width 2 mmx11 mm	7 m	2 mm dia.			
Width 4 mmx11 mm	15 m	2.6 mm dia.			

Reflectors

Name	Sensing distance (typical)	Model	Quantity	Remarks
Reflectors	3 m (rated value)	E39-R1	1	Attached to the Retroreflective E3S-CR□1 (-M1J).
	4 m	E39-R2	1	---
Small reflector	1.5 m	E39-R3	1	---
	750 mm	E39-R4	1	---
Tape Reflector	700 mm (50 mm) *	E39-RS1	1 pc.	The M.S.R. function is available.
	1,100 mm (100 mm) *	E39-RS2	1 pc.	
	1,400 mm (100 mm) *	E39-RS3	1 pc.	

* Values in parentheses indicate the minimum required distance between the sensor and reflector.
Note: 1 .When the reflector used is other than the supplied one, set the sensing distance to about 0.7 times of the typical example as a guideline.

Mounting Brackets

Shape	Model	Quantity	Remarks
	E39-L102	1	Attached to the horizontal model.
	E39-L103	1	Attached to the vertical model.
	E39-L85	1	Mounting bracket designed to switch from E3S-□□□□□42, 44 to the vertical model of E3S-C.
	E39-L86	1	Mounting bracket designed to switch from E3S-□□□□□43 to the vertical model of E3S-C.
	E39-L87	1	---

Note: If a through-beam model is used, order two Mounting Brackets for the emitter and receiver respectively.

Sensor I/O Connectors

Cable	Shape	Cable length		Model
Standard cable	Straight 	2 m	3-wire type	XS2F-D421-DC0-A
		5 m		XS2F-D421-GC0-A
	L-shaped 	2 m		XS2F-D422-DC0-A
		5 m		XS2F-D422-GC0-A

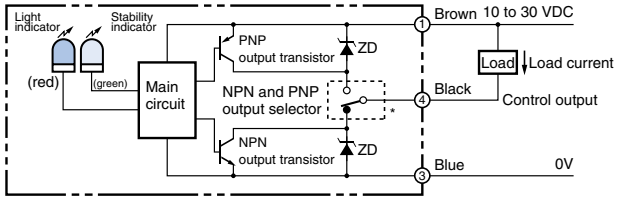
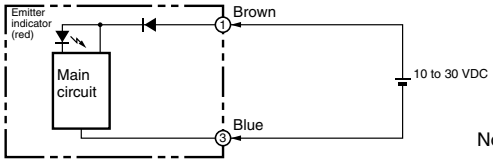
Rating/performance

Item \ Sensor type / Model	Through-beam	Retroreflective model (with M.S.R. function)	Diffuse-reflective	
	Horizontal E3S-CT11 (-M1J) Vertical E3S-CT61 (-M1J)	Horizontal E3S-CR11 (-M1J) Vertical E3S-CR61 (-M1J)	Horizontal E3S-CD11 (-M1J) Vertical E3S-CD61 (-M1J)	Horizontal E3S-CD12 (-M1J) Vertical E3S-CD62 (-M1J)
Sensing distance	30 m	3 m (When using the E39-R1)	700 mm (White paper 300 x 300 mm)	2 m (White paper 300 x 300 mm)
Standard sensing object	Opaque, 15dia. min.	Opaque: 75 mm dia. min.	---	
Differential distance	---		20% max. of sensing distance	
Directional angle	Both emitter and receiver: 3° to 15°	3° to 10°	---	
Light source (wave length)	Infrared LED (880 nm)	Red LED (700 nm)	Infrared LED (880 nm)	
Supply voltage	10 to 30 VDC [ripple (p-p) 10% included]			
Current consumption	Both emitter and receiver: 25 mA max.	40 mA max.		
Control output	Load 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 collector output type (NPN/PNP switch selectable) Light-ON/Dark-ON switch selectable			
Protective circuits	Reverse polarity protection, output short-circuit protection	Reverse polarity protection, output short-circuit protection, mutual interference prevention		
Response time	Operation or reset: 1 ms max.			Operation/reset: 2 ms max. each
Sensitivity adjustment	Single-turn adjustment		2-turn endless adjuster (with indicator)	
Ambient illuminance	(on Receiver lens) Incandescent lamp: 5,000 lux max. Sunlight: 10,000 lux max.			
Ambient temperature	Operating: -25°C to 55°C, Storage: -40°C to 70°C (with no icing or condensation)			
Ambient humidity	Operating: 35% to 85%RH, Storage: 35% to 95%RH (with no condensation)			
Insulation resistance	20 M min. at 500 VDC			
Dielectric strength	1,000 VAC at 50/60 Hz 1 minute			
Vibration resistance	10 to 2,000 Hz double amplitude 1.5 mm or 300 m/s^2 for 0.5 h in each of X, Y, Z directions			
Shock resistance	1000 m/s^2 (approx.- l00G) 3 times each in X, Y, and Z directions			
Protective structure	IEC Standard IP67, NEMA 6P (limited to indoors use) *			
Connection method	Pre-wired (standard length: 2 m), Junction connector (standard length: 300 mm)			
Weight (Packed state)	About 270 g (pre-wired type) About 230 g (M12 connector joint type)	About 160 g (pre-wired type) About 130 g (M12 connector joint type)	About 150 g (pre-wired type) About 110 g (M12 connector joint type)	
Material: Case	Zinc diecast			
Material: Operation panel cover	Polyethyl sulfon			
Material: Lens	Acrylics			
Material: Mounting Brackets	Stainless steel (SUS304)			
Accessories	Mounting bracket (with screws), adjusting screwdriver, instruction manual, reflector (Retroreflective model only)			

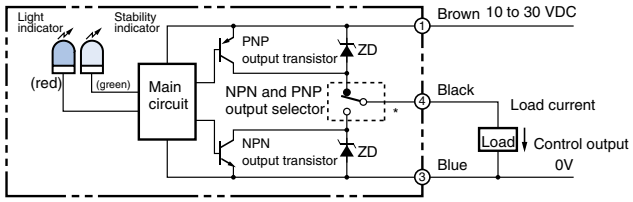
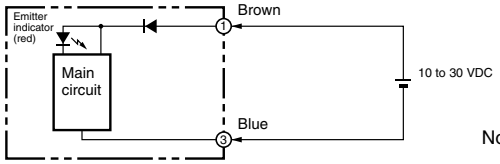
* NEMA (National Electrical Manufacturers Association) Standards

Output Circuit Diagram

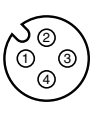
NPN output

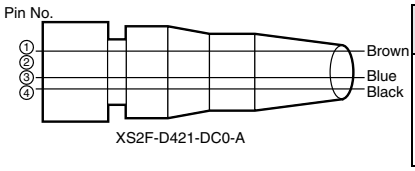
Model	Operating status of output transistor	Timing chart	Mode selection switch	Output circuit
E3S-CT11(-M1J) E3S-CT61(-M1J) E3S-CR11(-M1J) E3S-CR61(-M1J) E3S-CD11(-M1J) E3S-CD12(-M1J) E3S-CD61(-M1J) E3S-CD62(-M1J)	Light ON	Incident / Interrupted Light indicator (red): ON / OFF Output transistor: ON / OFF Load (Relay): Operate / Reset (Between brown and black)	L ON (LIGHT ON)	Receiver (Through-beam Models) Retroreflective, Diffuse Reflective, and Limited Reflective Models  * Note: Set the NPN and PNP output selector to NPN. Connector Pin Arrangement  Note: Terminal 2 is not used.
	Dark ON	Incident / Interrupted Light indicator (red): ON / OFF Output transistor: ON / OFF Load (Relay): Operate / Reset (Between brown and black)	D ON (DARK ON)	
	Emitter (Through-beam Models)  			Connector Pin Arrangement  Note: Terminal 2 and 4 are not used.

PNP output

Model	Operating status of output transistor	Timing chart	Mode selection switch	Output circuit
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 / Interrupted Light indicator (red): ON / OFF Output transistor: ON / OFF Load (Relay): Operate / Reset (Between blue and black)	L ON (LIGHT ON)	Receiver (Through-beam Models) Retroreflective, Diffuse Reflective, and Limited Reflective Models  * Note: Set the NPN and PNP output selector to PNP. Connector Pin Arrangement  Note: Terminal 2 is not used.
	Dark ON	Incident / Interrupted Light indicator (red): ON / OFF Output transistor: ON / OFF Load (Relay): Operate / Reset (Between blue and black)	D ON (DARK ON)	
	Emitter (Through-beam Models)  			Connector Pin Arrangement  Note: Terminal 2 and 4 are not used.

Connectors (Sensor I/O connectors)





XS2F-D421-DC0-A

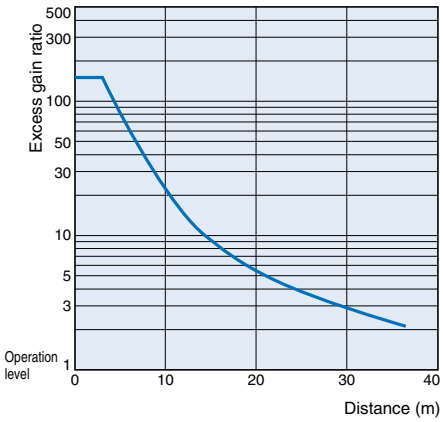
Class	Wire, outer jacket color	Connector pin No.	Application
For DC	Brown	①	+V
	---	②	---
	Blue	③	0V
	Black	④	Output

Note: Pin 2 is open.

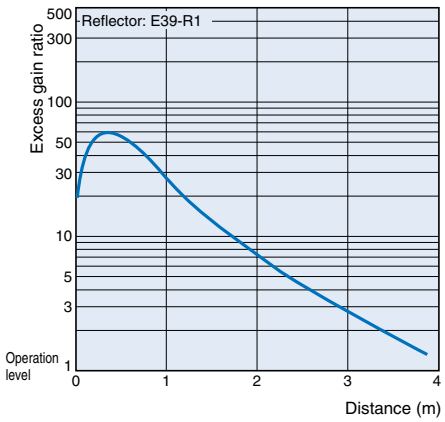
Characteristic data (typical)

Operating Range

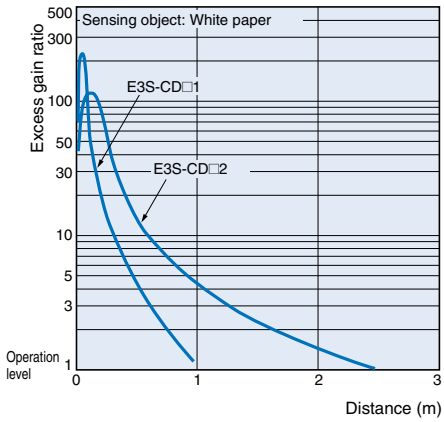
Through-beam
E3S-CT□1(-M1J)



Retroreflective Models
E3S-CR□1 (-M1J) + E39-R1 (supplied reflector)

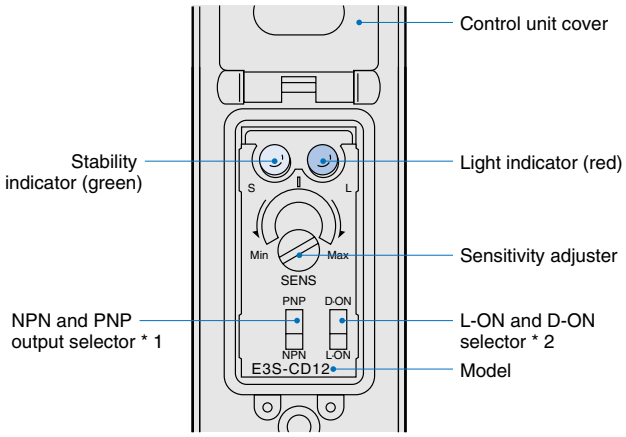


Diffuse-reflective
E3S-CD□□(-M1J)

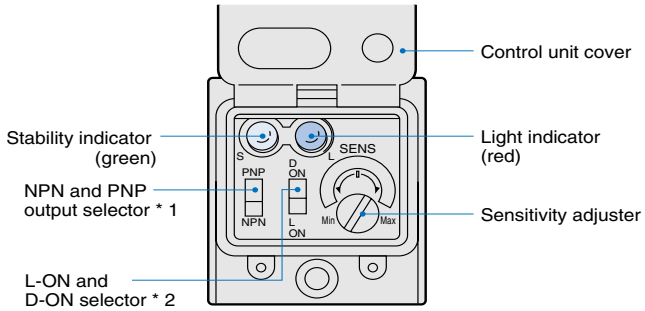


Nomenclature:

(Horizontal type)



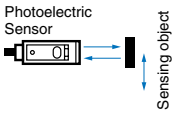
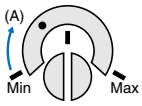
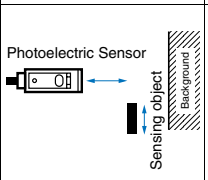
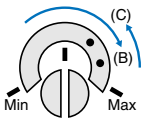
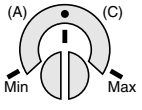
(Vertical type)



*1. The output transistor can be selected with the NPN/PNP output selector.
*2. The operation mode can be selected with the L/OND/ON selector.
Note: The through-beam and retroreflective models are different in sensitivity adjuster shape.

Operation

Sensitivity adjustment (diffuse reflective model, light-ON)

Sequence	Detection state	Sensitivity adjuster	Indicator state	Adjustment procedure
① Point A			ON→OFF ○ Stability indicator (green) OFF→ON ● Light indicator (red)	Place a sensing object in the predetermined position, turn the sensitivity adjuster clockwise (increase sensitivity) until the incident indicator (red) is turned ON, and define this position as (A).
② Point B			ON→OFF ○ Stability indicator (green) ON→OFF ● Light indicator (red)	Remove the sensing object, turn the sensitivity adjuster further clockwise until the incident indicator (red) is turned ON by a background object, and define this position as (B). Turn the sensitivity adjuster counterclockwise (decrease sensitivity) from (B) until the incident indicator (red) is turned OFF, and define this position as (C). When there is no background object, define the maximum adjuster position (Max) as (C).
③ Setting	---		ON ○ Stability indicator (green) ON↔OFF ● Light indicator (red)	Set the adjuster in the middle of positions (A) and (C) (optimum sensitivity setting). Also make sure that the stability indicator (green) is turned ON when there is an object and when there is no object. When the indicator is not turned ON, recheck the detection method since there is a little allowance.

Unlike the conventional models, the E3S-C scarcely has sensitivity variations between products. Therefore, you need to make the above adjustment on only one diffuse reflective model of E3S-CD that will be used for detection under the same conditions, and match the indicator points of the other diffuse reflective models of E3S-CD with the above adjusted one. (You need not match the sensitivity of each sensor.)

Precautions

Correct Use

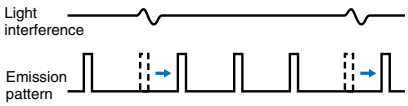
Design

Fuzzy mutual interference prevention

When reflective photoelectric sensors are installed side by side, one sensor may receive the light from the other sensor, which may disturb the incident signal, causing a malfunction. The fuzzy mutual interference prevention monitors interfering light for a predetermined period of time before light is emitted, and imports the interfering light level and incident frequencies as data. Using these values, fuzzy inference is made to find the risk of malfunction to control the light emitting timing, reducing the risk.

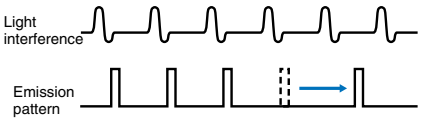
(When risk is low)

Light is emitted after interfering light is gone.



(When risk is high)

Light is emitted after shifting to a gap of interfering light.



Wiring Considerations

Cable

- An oil-resistance cable is used to ensure oil resistance.
- The bending radius should be 25 mm or more.

Installation

Sensor installation

- Note that during the E35-C installation, hammering it will damage the water resistance function.
- Use an M4 screw, tightened to a torque of no more than 1.18 Nm.

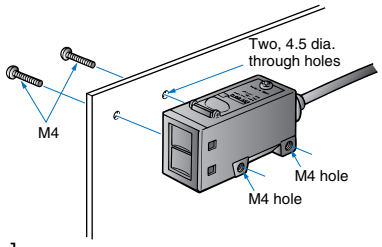
(When using the mounting bracket)

- To set the sensor on the mechanical axis, use the optical axis locking holes.
- When the sensor cannot be set on the mechanical axis, move the E3S-C vertically and/or horizontally and set it in the center of the area where the incident indicator is turned ON. Make sure that the stability indicator is ON.

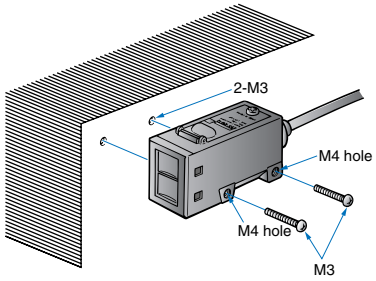
(Direct installation)

Install the E3S-C as shown below.

[M4 screwing]



[M3 screwing]

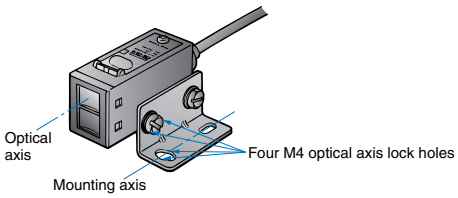


Optical axis adjustment

(Optical axis locking holes)

By fitting screws into the optical axis locking holes, the mounting bracket is set onto the mounting shaft of the mounting bracket.

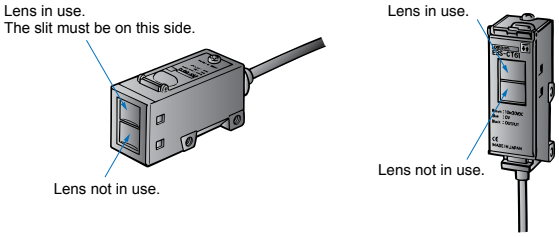
For adjustment



Optical axis position of through-beam model

Unlike the conventional product, the through-beam model has two lenses, but the one actually used is as shown below. When fitting the slit, use it after matching the slit hole with the used lens.

(Horizontal model) (Vertical model)



Water Resistance

To ensure water resistance, tighten the operation panel cover screws to 0.34 Nm to 0.54 Nm torque.

Miscellaneous

Oil resistance/chemical resistance

- Though E3S-C has a high oil resistance, it may not be able to exhibit its performance depending on the oil type. Use oil in compliance with the following table.
- Regarding the oil resistance of E3S-C, it has passed tests on the oils given in the following table. Refer to the table for examining the oil to be used.

Testing oil classification	JIS classification	Product name	Dynamic viscosity (mm^2/s) at 40°C	PH
Lubricant	---	Velocity No. 3	2.02	---
Water-insoluble coolant	Class 2 No. 5	Daphne Cut	Not less than 10 to less than 50	
	Class 2 No. 11	Yushiron Oil No. 2ac	Less than 10	
Water-soluble coolant	Class W1 No. 1	Yushiroken EC50T-3	---	7 to 9.5
		Yushiron Lubic HWC68		7 to 9.9
	Class W1 No. 2	Gryton 1700D		7 to 9.2
	Class W2 No. 1	Yushiroken S50N		7 to 9.8

Note: 1. The E3S-C was immersed in the oils in the above table at 50°C for 240 hours, and passed the test of 100-M or more insulation resistance.
2. For use in the environment where the E3S-C is exposed to the oil other than those in the above table, use the dynamic viscosity and PH in the above table. Pre-examine the oils since the sensor may be affected by additives and like in the oils.

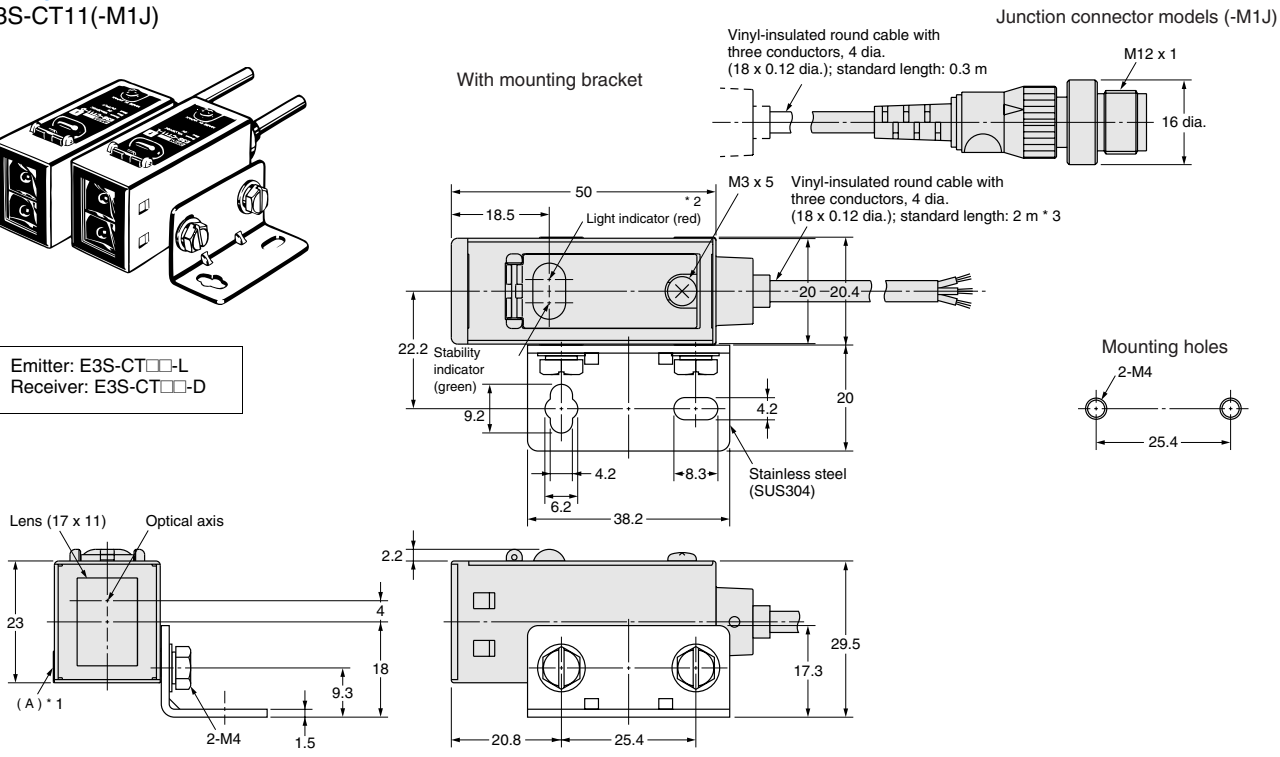
Dimensions (Unit: mm)

Sensors

Through-beam model (horizontal model)

E3S-CT11(-M1J)

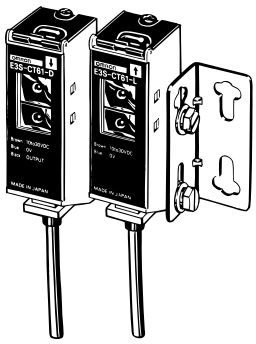
Emitter: E3S-CT□□-L
Receiver: E3S-CT□□-D



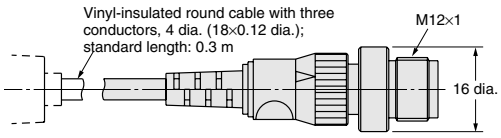
* Note: 1. Mounting bracket can be attached to side A.
2. The emitter for through-beam sensors have only the power supply indicator.
3. The cable for emitters for through-beam sensors is two-conductor, 4 dia. (27 x 12 dia.).

Through-beam model (vertical model)

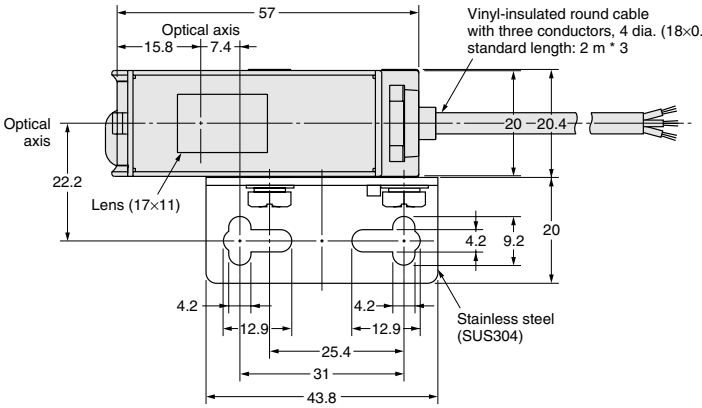
E3S-CT61(-M1J)



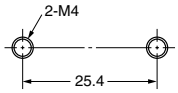
Junction connector models (-M1J)

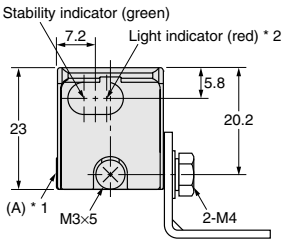


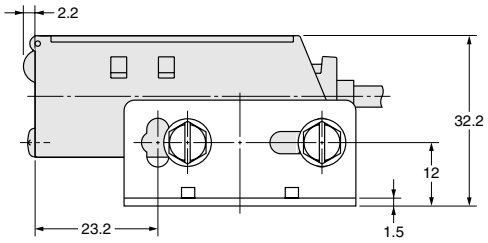
With mounting bracket



Mounting holes



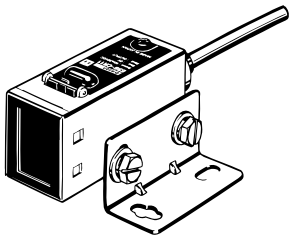




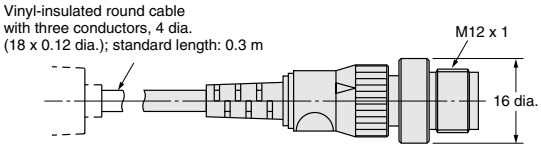
* 1. Mounting bracket can be attached to side A.
* 2. The emitter for through-beam sensors have only the power supply indicator.
* 3. The cable for emitters for through-beam sensors is two-conductor, 4 dia. (27×12 dia.).

Retro/diffuse reflective model (horizontal model)

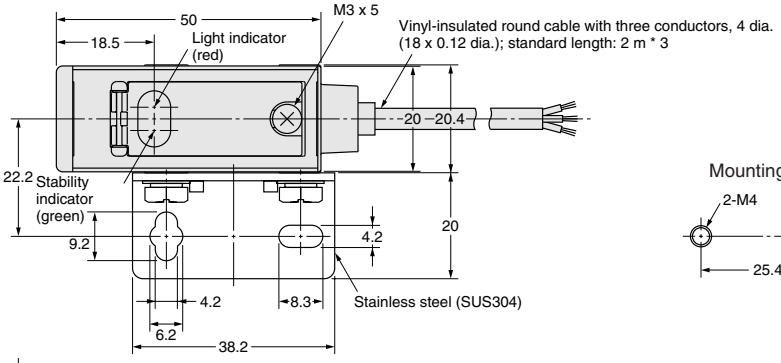
E3S-CR11(-M1J)
E3S-CD11(-M1J)
E3S-CD12(-M1J)



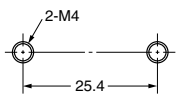
Junction connector models (-M1J)

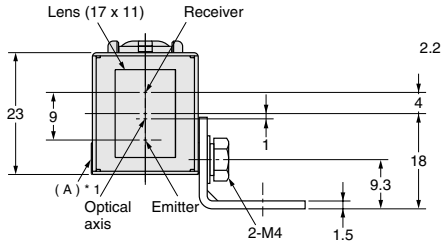


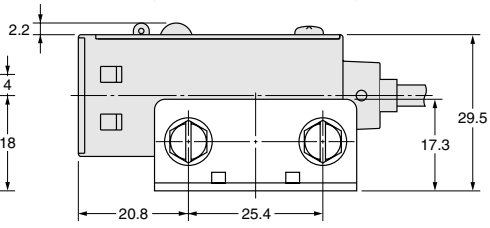
With mounting bracket



Mounting holes



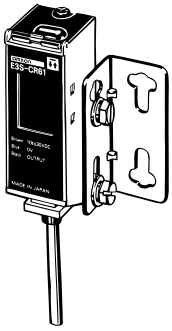


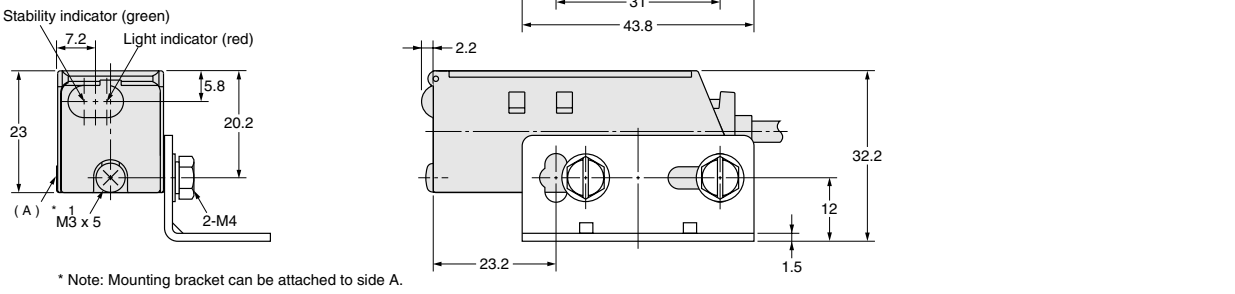


* Note: Mounting bracket can be attached to side A.

Retro/diffuse reflective model (vertical model)

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



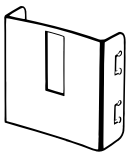


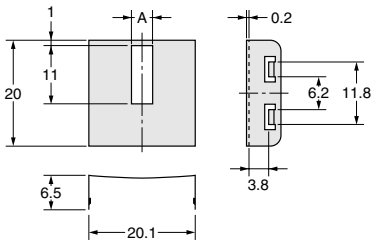
* Note: Mounting bracket can be attached to side A.

Accessories (Order Separately)

Plug-in type long slit (for through-beam model)

E39-S61





Dimension A (mm)	Material	Quantity
0.5	Stainless steel (SUS 304)	1 each for emitter and receiver (total of 8 pcs.)
1		
2		
4		

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E229-E2-04-X

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

Distance setting photoelectric sensor in metal housing

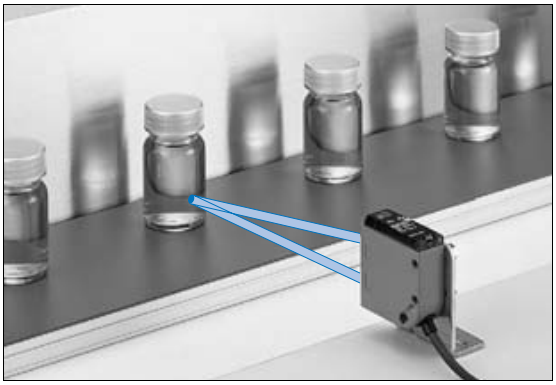
E3S-CL

- High water, oil and detergent resistance
- Minimal black/white error for highest reliability detecting different colored objects (E3S-CL1)

Features

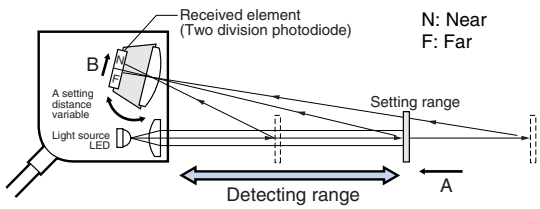
Eliminates Background Influences with a Hysteresis of Only 2% max. (E3S-CL1)

The hysteresis is the industry's minimum 2% max. (E3S-CL1). As a triangulation measuring is used, objects behind the setting distance cannot be detected. The sensor is insensitive to the influence of background objects of high reflectivity, and stable detects works on a conveyor from above. The hysteresis of the E3S-CL2 is 10% max. of the detecting distance (5% max. for white paper).

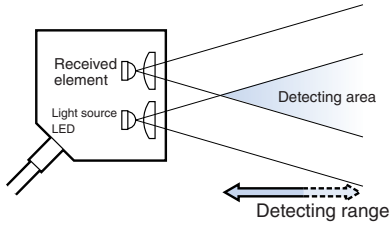


What Is Distance Setting? (Differences from other detecting system)

Distance-setting

Features	When the sensing object moves in direction A, the center position of the reflected light moves in direction B. This is received by the 2-split photodiode and the place where the incident levels are the same on the N and F sides is defined as the setting distance. The object is detected by the incident circuit processing only when N F, and is not detected when N F. Therefore, detection is stable without being influenced by the work type and background objects.
Structure	

Diffuse-reflective

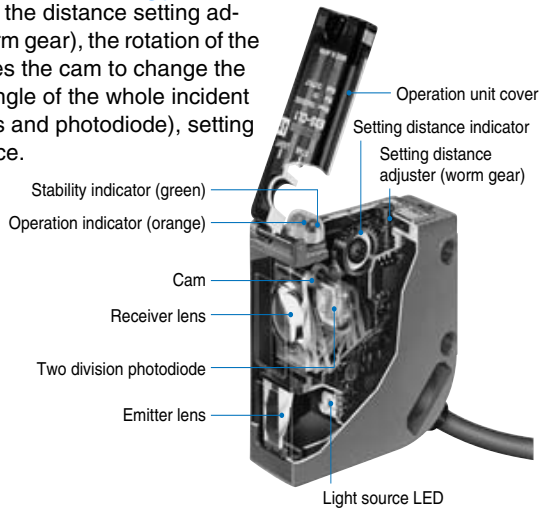
Features	Since the level of the reflected light is judged for detection , the sensing distance varies with the color, material and/or size of the work. A malfunction may occur if there is any object of high reflectivity in the background.
Structure	

6-turn adjuster with indicator

- The 6-turn adjuster with indicator ensures ease of distance setting.
- Fine distance setting is possible.

Optical Technology of E3S-CL

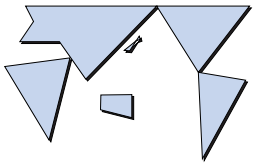
By turning the distance setting adjuster (worm gear), the rotation of the gear moves the cam to change the incident angle of the whole incident block (lens and photodiode), setting the distance.



- NPN/PNP Output Selectable.
- Light-ON/Dark-ON is also switch selectable.

Conforms to Applicable EN/IEC Standards

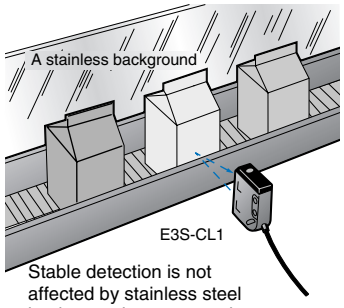
- The sensors satisfy the electrical safety (IEC947-5-2), noise resistance (IEC947-5-2, IEC801-2/3/4) and noise radiation restrictions (EN500 81-2, EN55011) required for photoelectric sensors.



Application

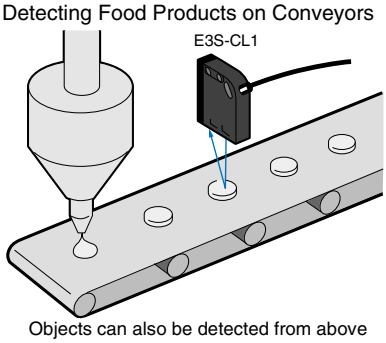
E3S-CL1

Detecting Milk Cartons



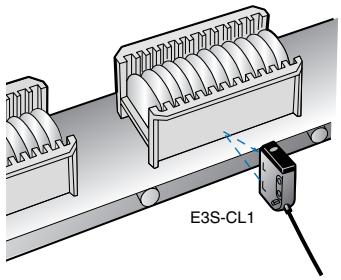
Stable detection is not affected by stainless steel background or carton colors.

Detecting Food Products on Conveyors



Objects can also be detected from above a conveyor.

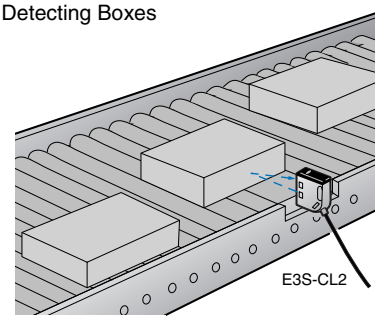
Detecting Wafer Cassettes



Easy distance setting with 6-turn adjustment and indicator.

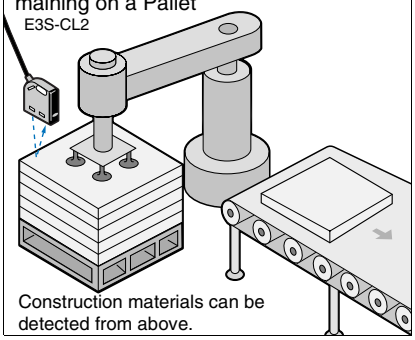
E3S-CL2

Detecting Boxes



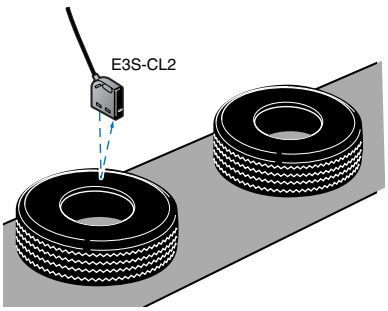
Stable detecting boxes regardless of box position.

Detecting Construction Materials (Boards) maining on a Pallet



Construction materials can be detected from above.

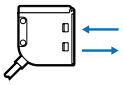
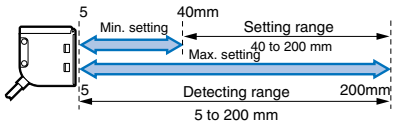
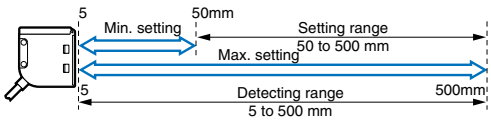
Detecting Tires on a Conveyor Line



Stable detecting black objects such as tires.

Ordering Information

Red light Infrared light

Shape	Sensing/Setting range	Model
		E3S-CL1
		E3S-CL2

Rating/performance

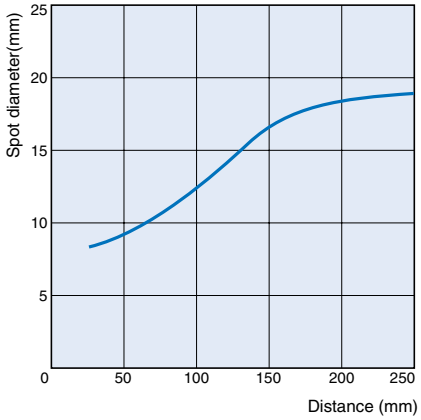
Item \ Sensing method / Model	Distance-setting	
	E3S-CL1	E3S-CL2
Sensing	5 to 200 mm (White paper 200 x 200 mm) (Setting distance 200 mm)	5 to 500 mm (White paper 200 x 200 mm) (Setting distance 500 mm)
Setting range	40 to 200 mm (White paper 200 x 200 mm)	50 to 500 mm (White paper 200 x 200 mm)
Differential distance	2% max.	10% max.
Reflectivity characteristics (black/white error) *1	2% max.	10% max.
Light source (wave length)	Red LED (700 nm)	Infrared LED (860 nm)
Power supply voltage	10 to 30 VDC [ripple (p-p) 10% included]	
Current consumption	35 mA max.	50 mA max.
Control output	Load 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 collector output type (NPN/PNP switch selectable) Light-ON/Dark-ON switch selectable	
Protective circuits	Reverse polarity protection, output short-circuit protection, mutual interference prevention	
Response time	Operation or reset: 1 ms max.	Operation or reset: 2 ms max.
Distance setting	6-turn endless adjuster (with indicator)	
Ambient illuminance	Incandescent lamp: 5,000 lux max. Sunlight 10,000 lux max.	
Ambient temperature	Operating/Storage: -25°C to 55°C (with no icing or condensation)	
Ambient humidity	Operating/Storage: 35% to 85%RH (with no condensation)	
Insulation resistance	20 M min. at 500 VDC	
Dielectric strength	1,000 VAC at 50/60 Hz for 1 minute	
Vibration resistance	10 to 55 Hz, 1.5 mm double amplitude for 2 hours each in X, Y, and Z directions	
Shock resistance	Destruction: 500 m/s^2 for 3 times each in X, Y, and Z directions	
Protective structure	IEC Standard IP67, NEMA 6P (limited to indoor use) *2	IEC Standard IP67, NEMA 6P (limited to indoor use)
Connection method	Pre-wired models (standard length: 2 m)	
Weight (Packed state)	Approx. 170 g	
Ma-terial: Case	Zinc diecast	
Ma-terial: Operation panel cover	Polyethyl sulfon	
Ma-terial: Lens	Acrylics	
Ma-terial: Mounting Brackets	Stainless steel (SUS304)	
Accessories	Mounting bracket, hexagon bolt M4 x 12 (with spring washer, flat washer), adjusting screwdriver, instruction manual	

*1. Sensing distance difference between standard white paper (reflectivity 90%) and standard black paper (reflectivity 5%)
*2. NEMA (National Electrical Manufacturers Association) Standards

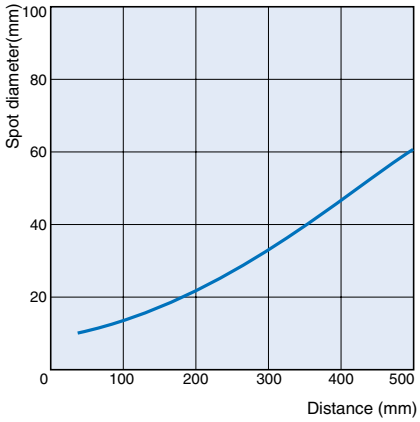
Characteristic data (typical)

Spot Diameter vs. Sensing Distance

E3S-CL1

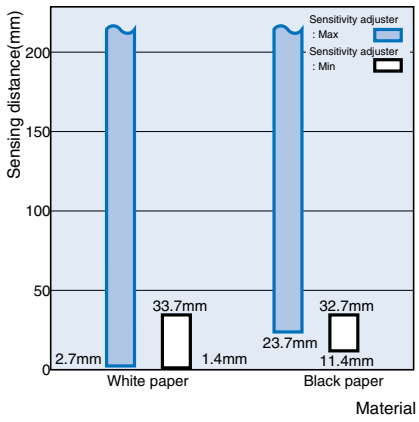


E3S-CL2

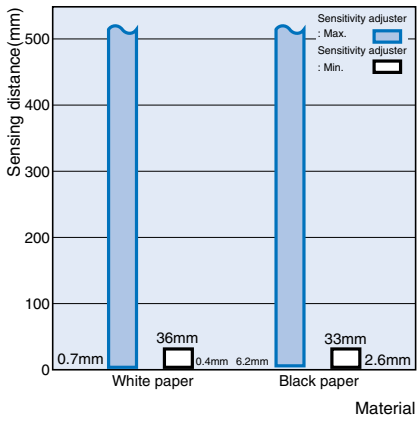


Short distance characteristic

E3S-CL1

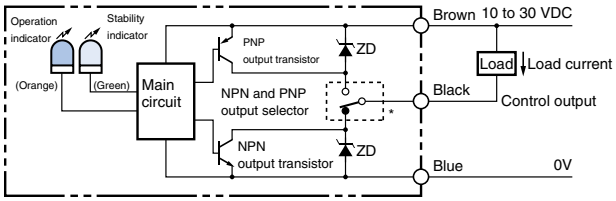


E3S-CL2

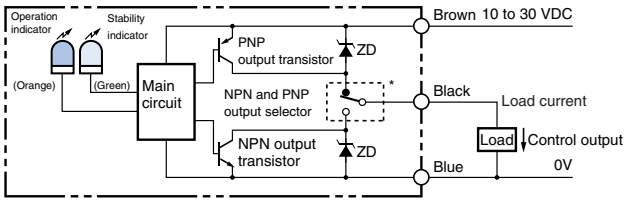


Output Circuit Diagram

NPN output

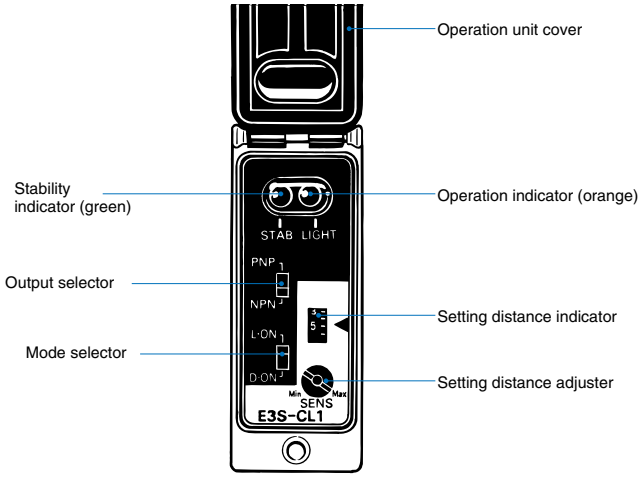
Model	Operating status of output transistor	Timing chart	Mode selection switch	Output circuit
E3S-CL1 E3S-CL2	Light ON	Incident Interrupted Operation indicator (orange) ON OFF Output transistor ON OFF Load (Relay) Operate Reset	L ON (LIGHT ON)	 * Please make a changeover switch into the NPN side.
	Dark ON	Incident Interrupted Operation indicator (orange) ON OFF Output transistor ON OFF Load (Relay) Operate Reset	D ON (DARK ON)	

PNP output

Model	Operating status of output transistor	Timing chart	Mode selection switch	Output circuit
E3S-CL1 E3S-CL2	Light ON	Incident Interrupted Operation indicator (orange) ON OFF Output transistor ON OFF Load (Relay) Operate Reset	L ON (LIGHT ON)	 * Please make a changeover switch into the PNP side.
	Dark ON	Incident Interrupted Operation indicator (orange) ON OFF Output transistor ON OFF Load (Relay) Operate Reset	D ON (DARK ON)	

Nomenclature:

Operation panel



Output selection switch

① When using the sensor with NPN output, move the switch to the NPN position.

② When using the sensor with PNP output, move the switch to the PNP position.

Mode selection switch

① When using the sensor with Light-ON, move the switch to the **L•ON** position.

② When using the sensor with Dark-ON, move the switch to the **D•ON** position.

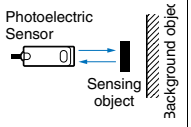
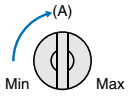
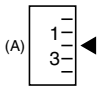
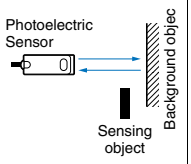
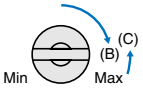
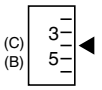
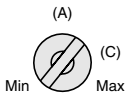
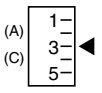
Distance Adjuster

① Turning the distance setting adjuster clockwise (to the Max position) increases the detecting distance, and turning it counterclockwise (to the Min position) decreases the distance.

② The distance setting adjuster is a 6-turn endless adjuster ranging from the Min position to the Max position, and its number of turns is displayed on the setting distance indicator according to the rotation of the adjuster.

Operation

Sensitivity adjustment (distance setting type, Light-ON)

Sequence	Detection state	Position of distance setting adjuster	State of setting distance indicator	Indicator state	Adjustment Steps
(1) Point (A)				ON→OFF Stability indicator (green) OFF→ON Operation indicator (orange)	Place a sensing object in the predetermined position, turn the adjuster clockwise until the incident indicator (orange) is turned ON, and define this position as (A).
(2) Points (B), (C)				ON→OFF Stability indicator (green) ON→OFF Operation indicator (orange)	(1) If there is a background object, remove the sensing object, turn the adjuster further clockwise until the incident indicator (orange) is turned ON, and define this position as (B). Turn the adjuster counterclockwise from (B) until the incident indicator (orange) is turned OFF, and define this position as (C). (2) If there is no background object, define the maximum adjuster position (Max) as (C).
(3) Setting	---			ON Stability indicator (green) ON↔OFF Operation indicator (orange)	Set the adjuster in the middle of positions (A) and (C). Also make sure that the stability indicator (green) is turned ON when there is an object and when there is no object. When the indicator is not turned ON, reexamine the detection method since there is a little allowance.

Precautions

Correct Use

Design

Cable

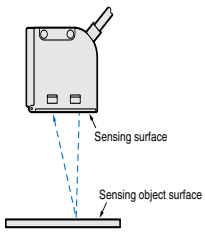
The oil-resistant cable is used to ensure oil resistance.
(E3S-CL2)

Installation

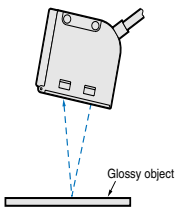
Sensor installation

Mounting orientation

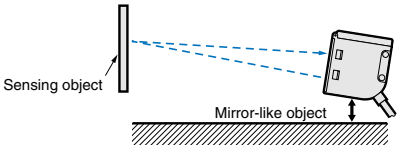
- Install the photoelectric sensor in such manner that its detection surface and the object surface are parallel (without inclination relative to the sensing object).



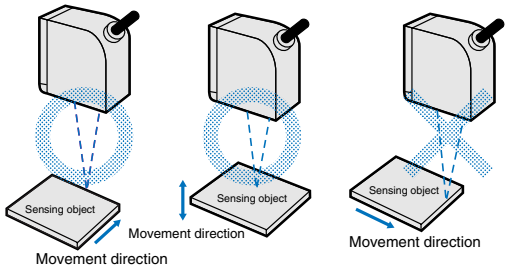
If the sensing object has a glossy surface, incline the Sensor by 5° to 10° as shown on the right. In this case, ensure that the Sensor is not influenced by any background objects.



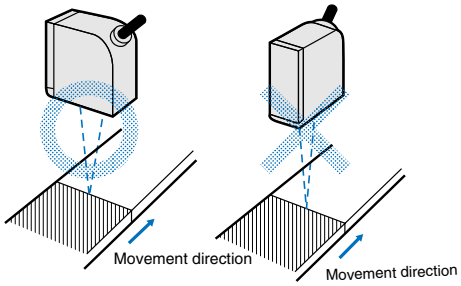
- If there is a mirror-smooth object under the photoelectric sensor, operation may become instable. Therefore, incline the photoelectric sensor as shown below or move it away from the object.



- Install the photoelectric sensor in either of the following orientations, being careful of the direction in which the sensing object will move.



- Also, when the color/material of the sensing object varies extremely, install the photoelectric sensor in either of the following orientations.



- Install the photoelectric sensor so that the sun, fluorescent lamp, incandescent lamp or any other strong light will not enter the directional angle range of the sensor.

Mounting Precautions

- Do not strike the Photoelectric Sensor with a hammer or any other tool during the installation of the Sensor, or the Sensor will loose its water-resistive properties.
- Use M4 screws.
- Tighten the screws to the torque of 1.2 Nm max.

Others

Oil resistance/chemical resistance (E3S-CL2)

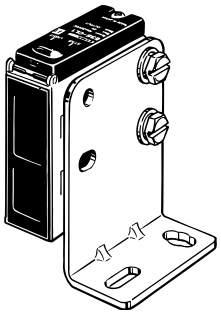
For the oil resistance ofE3S-CL2, the Sensor has passed tests on the oils given in the following table. Refer to the table for examining the oil to be used. Depending on the oil type, however, the Sensor may not be able to exhibit its performance.

Testing oil classification	JIS classification	Product name	Dynamic viscosity (mm^2/s) at 40°C	PH
Lubricant	---	Velocity No. 3	2.02	---
Water-insoluble coolant	Class 2 No. 5	Daphne Cut	Not less than 10 to less than 50	
	Class 2 No. 11	Yushiron Oil No. 2ac	Less than 10	
Water-soluble coolant	Class W1 No. 1	Yushiroken EC50T-3	---	7`9.5
		Yushiron Lubic HWC68		7`9.9
	Class W1 No. 2	Gryton 1700D		7`9.2
	Class W2 No. 1	Yushiroken S50N		7`9.8

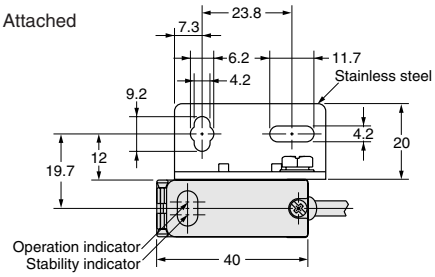
Note: 1. E3S-C was submerged in the oils in the above table at 50°C for 240 hours, and passed the test of 100-M or more insulation resistance.
2. For use in the environment where E3S-C is exposed to the oil other than those in the above table, use the dynamic viscosity and PH in the above table. Pre-check the oils since the sensor may be affected by additives etc. in the oils.

Dimensions (Unit: mm)

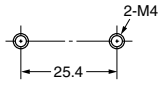
E3S-CL1
E3S-CL2

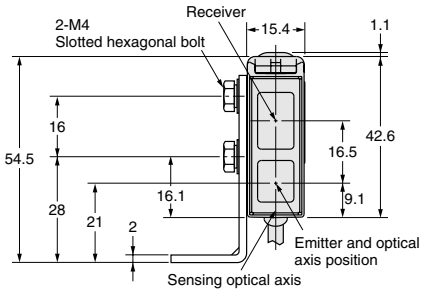


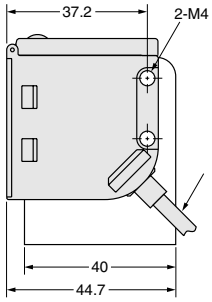
With Mounting Bracket Attached



Mounting holes







E3S-CL1: Vinyl-insulated round cable of 4 dia.
3 cores conductor cross-sectional area: 0.2 mm^2; insulation diameter: 1.1 mm
Standard length: 2 m

E3S-CL2: Vinyl-insulated round cable of 4 dia.
3 cores conductor cross-sectional area: 0.2 mm^2; insulation diameter: 1.1 mm
Standard length: 2 m

Note: The output selector, mode selector and distance setting adjuster are exposed when the cover is opened.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E237-E2-02A-X In the interest of product improvement, specifications are subject to change without notice.

Photoelectric switch with built-in amplifier (long distance) in plastic housing

E3G

Retroreflective Models

- Sensing Distance of 10 m, with polarized light to detect shiny objects.
- Operation stability monitored ba the stability indicator.

Distance-setting Models

- Distance setting models with a long 2 m sensing distance incorporate a teaching function.
- Set sensing area (zone setting) function allows detection of shiny objects with uneven surface.

Common Features

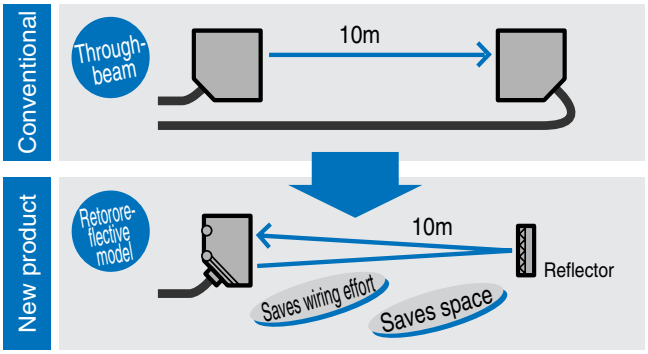
- Meets IEC IP67 requirements.
- M12 rotary connector, pre-wired or terminal block connection

Features

Retroreflective Models

Though the Size Is Compact, the Sensing Distance Is as Long as 10m.

Replace the conventional through-beam model with the retroreflective model for saving wiring and installation space.



Easy monitoring of Operation stability by means of stability indicator.

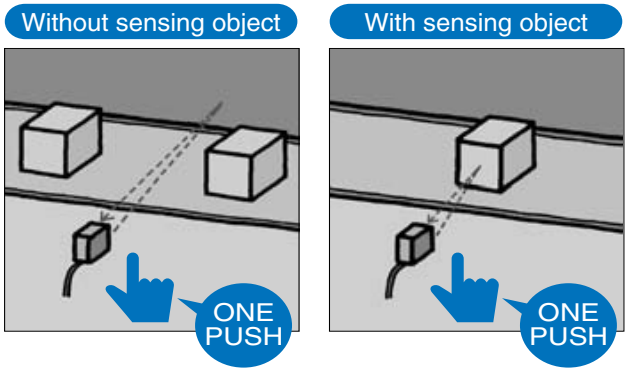
Distance-setting

Distance-setting Models with a Long 2-m Sensing Distance Incorporate a Teaching Function

Sensitivity adjustment without being influenced by background objects is possible by simply pressing a button. Useful for teaching without a sensing object.

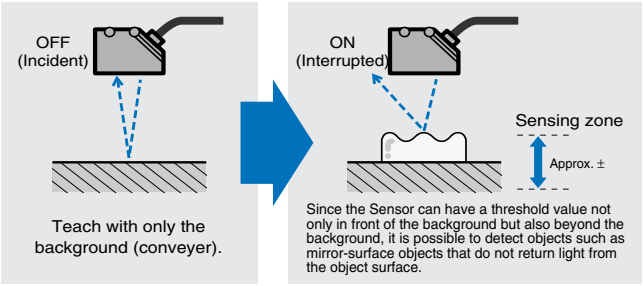
Easy Optimum Sensing Distance Adjustments

Teaching with and without a sensing object ensures highly accurate detection without influence from the background.



Zone Setting Function

Effective for detecting glossy objects, which were difficult to detect with conventional sensors. (D-ON)

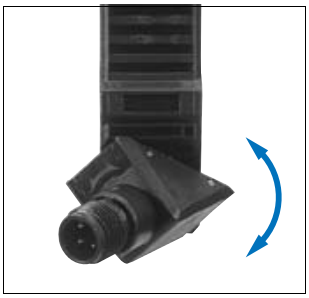


General

Select either transistor (NPN/PNP selectable) or relay output. Three connection methods (plus a model with a timer function). Select either a DC power supply or a variable power supply: 24 V to 240 VAC or 12 to 240 VDC).

IEC Standard IP67 Water Proofing

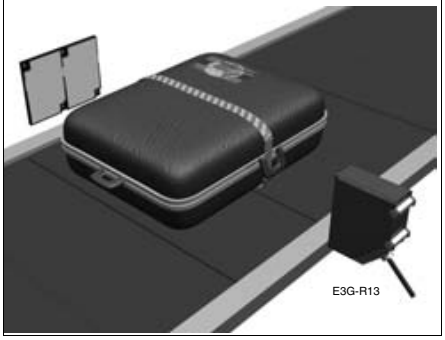
M12 Rotary Connector Available on Models with DC Power Supplies



Application

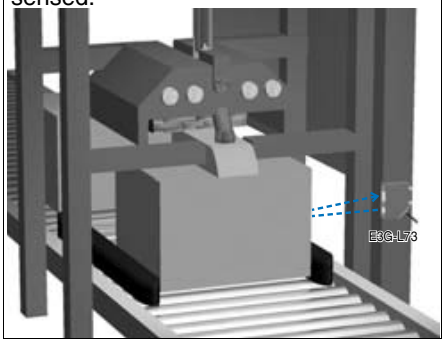
Detection of large works

Retroreflective model can make long-distance detection, saving wiring.

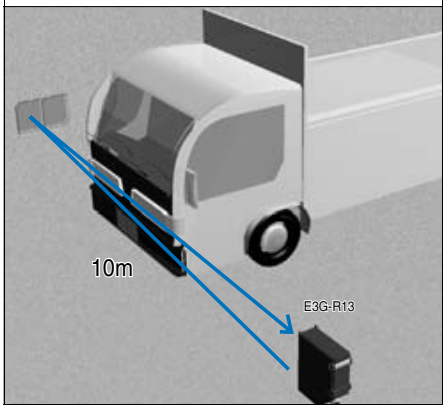


Detection of large corrugated cardboard

Just by installing the sensor on one side, only the boxes to be detected shall be sensed.



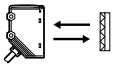
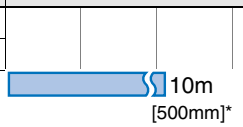
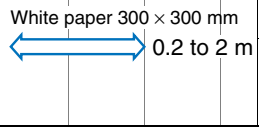
Detection of cars in multi-story parking lot



Ordering Information

Sensors

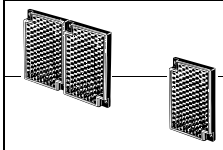
Red light Infrared light

Sensor type	Shape	Connection method	Sensing distance	Timer function	Model	
					NPN/PNP selector	Relay contact output
Retroreflective Models (with M.S.R. Function)		Pre-wired	 10m [500mm]*	---	E3G-R13-G	---
		Connector type			E3G-R17-G	
		Terminal block		ON or OFF delay 0 to 5 s (adjustable)	---	E3G-MR19-G
						E3G-MR19T-G
Distance-setting		Pre-wired	 White paper 300 × 300 mm 0.2 to 2 m	---	E3G-L73	---
		Connector type			E3G-L77	
		Terminal block		ON or OFF delay 0 to 5 s (adjustable)	---	E3G-ML79-G
						E3G-ML79T-G

* Values in parentheses indicate the minimum required distance between the sensor and reflector.

Accessories (Order Separately)

Reflectors

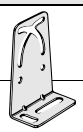
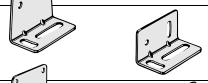
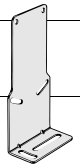
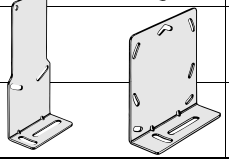
Shape	Sensing distance (typical)	Model	Quantity	Remarks
	10 m (500 mm) *	E39-R2	1	---
	6 m (100 mm) *	E39-R1S	1	---

* Values in parentheses indicate the minimum required distance between the sensor and reflector.

Terminal Protection Cover for Side-pullout Cable

Shape	Model	Quantity	Applicable type	Remarks
	E39-L129-G	1	E3G-MR19(T)-G E3G-ML79(T)-G	Provided with rubber bushing and cap for pullout prevention in horizontal direction

Mounting Brackets

Shape	Model	Quantity	Applicable type	Remarks
	E39-L131	1	E3G-R1□ E3G-L7□	---
	E39-L132	1		Rear-mounting use
	E39-L135	1	E3G-MR19(T)-G E3G-ML79(T)-G	Cable pulled out downwards
	E39-L136	1		---

Sensor I/O Connectors

Cable	Shape	Cable length		Model
Standard cable	Straight 	2 m	3-wire type	XS2F-D421-DC0-A
		5 m		XS2F-D421-GC0-A
	L-shaped 	2 m		XS2F-D422-DC0-A
		5 m		XS2F-D422-GC0-A

Rating/Performance

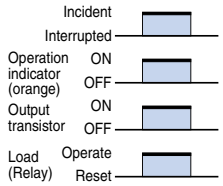
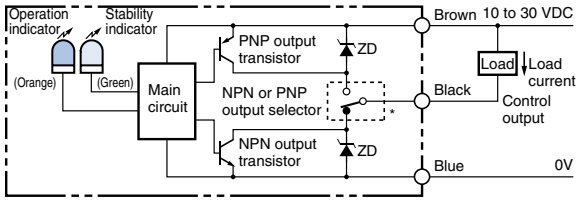
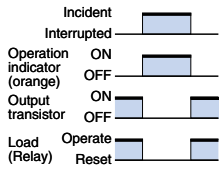
Sensor type		Retroreflective Models (M.S.R. function)				Distance-setting			
Item / Model		E3G-R13-G	E3G-R17-G	E3G-MR19-G	E3G-MR19T-G	E3G-L73	E3G-L77	E3G-ML79-G	E3G-ML79T-G
Sensing distance		10 m (500 mm) * (When using the E39-R2)				0.2 to 2 m (White paper 300 x 300 mm)			
Setting distance		---				0.5 to 1.2 m (White paper 300 x 300 mm)			
Standard sensing object		Opaque: 80 dia. min.				---			
Hysteresis (typical)		---				10% of setting distance			
Directional angle		Sensor: 1° to 5°				---			
Reflectivity characteristics (black/white error)		---				±10% max. (At detection distance of 1m)			
Light source (wave length)		Red LED (700 nm)				Infrared LED (860 nm)			
Spot size		---				70 mm dia. max. (At detection distance of 1m)			
Power supply voltage		10 to 30 VDC [Ripple (p-p) 10% included]		12 to 240 VDC ±10% ripple (p-p) : 10% max. 24 to 240 VAC ±10% 50/60 Hz		10 to 30 VDC (Ripple (p-p) 10% included)		12 to 240 VDC ±10% ripple (p-p) : 10% max. 24 to 240 VAC ±10% 50/60 Hz	
Current/Power consumption		50 mA max.		2 W max.		60 mA max.		2 W max.	
Control output		Load supply voltage 30 VDC max., load current 100 mA max. (residual voltage NPN output: 1.2 V max., PNP output: 2 V max.) Open collector output type (NPN/PNP output switch selectable) L-ON/D-ON switch selectable		Relay output: Switch-over contact 250 VAC 3A (cos =1) max. 30 VDC 3A max. L-ON/D-ON switch selectable		Load supply voltage 30 VDC max., load current 100 mA max. (residual voltage NPN output: 1.2 V max., PNP output: 2 V max.) Open collector output type (NPN/PNP output switch selectable) L-ON/D-ON switch selectable		Relay output: Switch-over contact 250 VAC 3A (cos =1) max. 30 VDC 3A max. L-ON/D-ON switch selectable	
Life expectancy (relay output)	Mechanical	---		50,000,000 operations min. (switching frequency: 18,000 operations/h)		---		50,000,000 operations min. (switching frequency: 18,000 operations/h)	
	Electrical	---		100,000 operations min. (switching frequency: 1,800 operations/h)		---		100,000 operations min. (switching frequency: 1,800 operations/h)	
Protective circuits		Reverse polarity protection, output short-circuit protection, mutual interference prevention		Mutual interference prevention function		Reverse polarity protection, output short-circuit protection, mutual interference prevention		Mutual interference prevention function	
Response time		Operation/reset: 1 ms each		Operation/reset: 30 ms each		Operation/reset: 5 ms each		Operation/reset: 30 ms each	
Sensitivity adjustment		One-turn adjuster				Teaching method (NORMAL mode/ZONE mode)			
Timer function		---			ON delay/ OFF delay 0 to 5 s (Adjuster variable system)	---			ON delay/ OFF delay 0 to 5 s (Adjuster variable system)
Ambient illuminance		Incandescent lamp: 3,000 lux max. Sunlight 10,000 lux max.							
Ambient temperature		Operating: -25°C to 55°C, Storage: -30°C to 70°C (with no icing or condensation)							
Ambient humidity		Operating: 35% to 85%RH, Storage: 35% to 95%RH (with no condensation)							
Insulation resistance		20 M min. at 500 VDC							
Dielectric strength		1,000 VAC at 50/60 Hz for 1 minute		2,000 VAC at 50/60 Hz for 1 minute		1,000 VAC at 50/60 Hz for 1 minute		2,000 VAC at 50/60 Hz for 1 minute	
Vibration resistance		Destruction: 10 to 55 Hz, 1.5 mm double amplitude for 2 hours each in X, Y, and Z directions							

* Values in parentheses indicate the minimum required distance between the sensor and reflector.

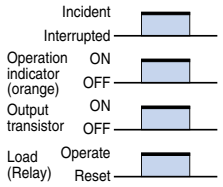
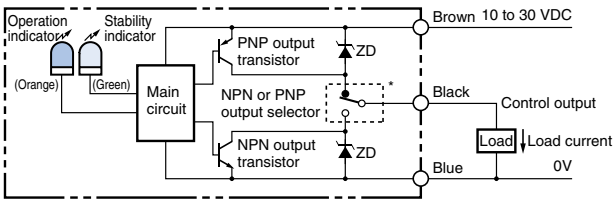
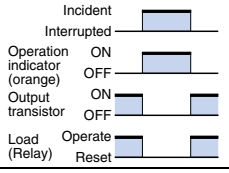
Sensor type		Retroreflective Models (M.S.R. function)				Distance-setting			
Item / Model		E3G-R13-G	E3G-R17-G	E3G-MR19-G	E3G-MR19T-G	E3G-L73	E3G-L77	E3G-ML79-G	E3G-ML79T-G
Shock resistance		500 m/s² 3 times in each of X, Y and Z directions							
Protective structure		IEC 60529 IP67 (with Protective Cover attached)							
Connection method		Pre-wired (standard length: 2 m)	M12 Connector	Terminal block		Pre-wired (standard length: 2 m)	M12 Connector	Terminal block	
Weight (Packed state)		Approx. 150 g	Approx. 50 g	Approx. 150 g			Approx. 50 g	Approx. 150 g	
Material	Case	PBT (polybutylene terephthalate)							
	Lens	Acrylics (PMMA)							
	Mounting Brackets	Stainless steel (SUS304)							
Accessories		Instruction sheet, and screwdriver for adjustment				Instruction sheet			

Output Circuit Diagram

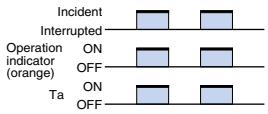
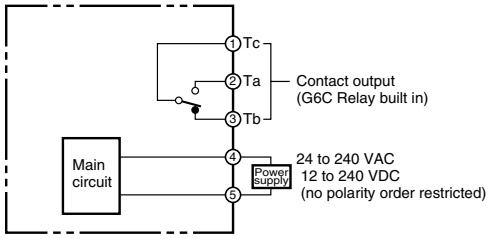
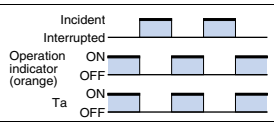
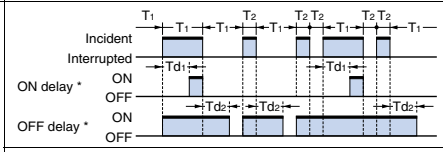
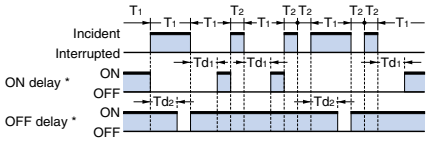
NPN output

Model	Operating status of output transistor	Timing chart	Mode selection switch	Output circuit
E3G-R13-G E3G-R17-G E3G-L73 E3G-L77	Light ON		L ON (LIGHT ON)	 * Set the NPN or PNP selector to NPN Connector Pin Arrangement  Note: Terminal 2 is not used.
	Dark ON		D ON (DARK ON)	

PNP output

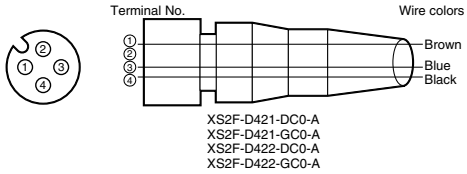
Model	Operating status of output transistor	Timing chart	Mode selection switch	Output circuit
E3G-R13-G E3G-R17-G E3G-L73 E3G-L77	Light ON		L ON (LIGHT ON)	 * Set the NPN or PNP selector to PNP Connector Pin Arrangement  Note: Terminal 2 is not used.
	Dark ON		D ON (DARK ON)	

Relay contact output

Timer function	Model	Timing chart	Mode selection switch	Output circuit
None	E3G-MR19-G E3G-ML79-G		L ON (LIGHT ON)	
			D ON (DARK ON)	
ON or OFF delay 0 to 5 s (adjustable)	E3G-MR19T-G E3G-ML79T-G		L ON (LIGHT ON)	
			D ON (DARK ON)	

* For ON and OFF, delay timers vary independently.
Note: Td1, Td2: Delay time (0 to 5 s), T1: Any period longer than delay time, T2: Any period shorter than delay time

Connectors (Sensor I/O connectors)



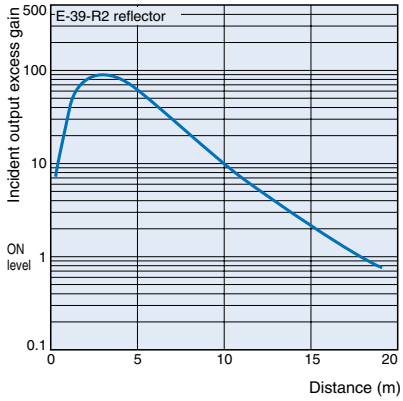
Class	Wire, outer jacket color	Connector pin No.	Application
For DC	Brown	①	Power supply (+V)
	-	②	-
	Blue	③	Power supply (0 V)
	Black	④	Output

Note: Pin 2 is not used.

Characteristic data (typical)

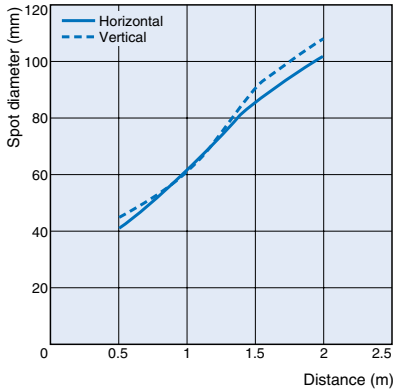
E3G-R/MR Retroreflective Models

Operating Range

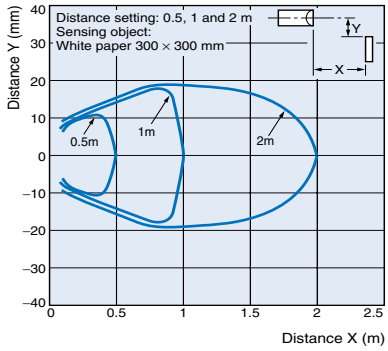


E3G-L/ML Distance-setting Models

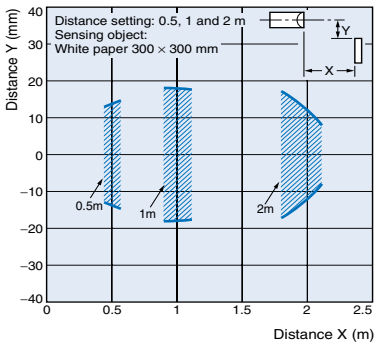
Spot Diameter vs. Sensing Distance



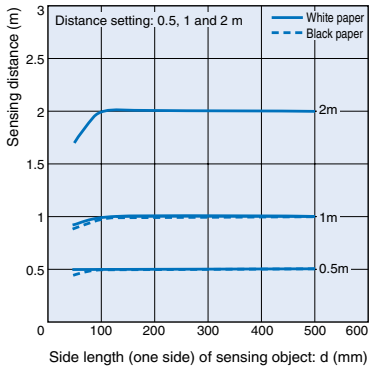
Sensing Zone (in NORMAL mode)



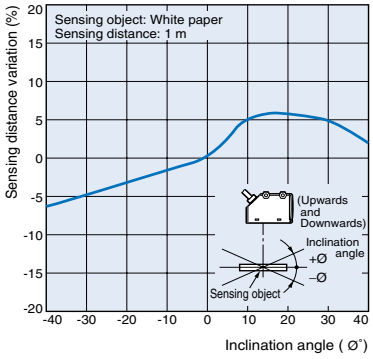
Sensing Zone in ZONE Mode



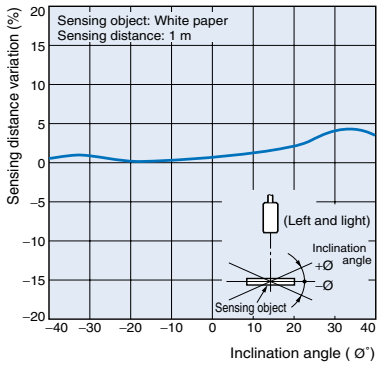
Sensing Object Size vs. Setting Distance



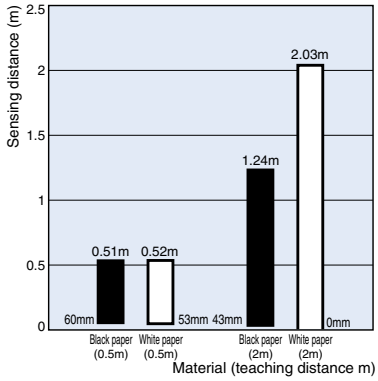
Sensing Object Angle Characteristics (Up and Down)



Sensing Object Angle (Left and Right)



Close-range Characteristics

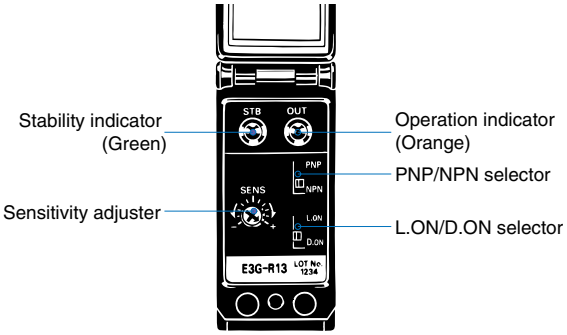


Nomenclature

Retroreflective Models

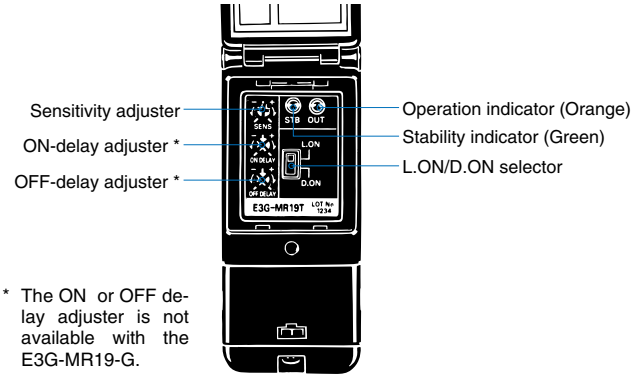
E3G-R13-G (Pre-wired model)

E3G-R17-G (Connector model)



E3G-MR19-G (Terminal Block Model)

E3G-MR19T-G (Terminal Block Model with Timer)

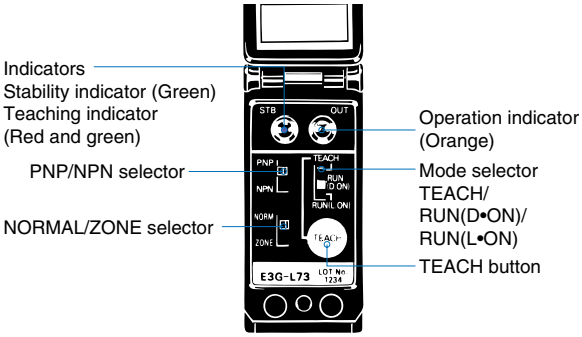


* The ON or OFF delay adjuster is not available with the E3G-MR19-G.

Distance-setting

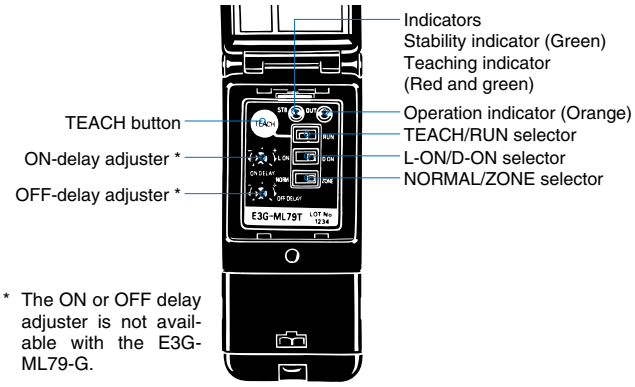
E3G-L73 (Pre-wired model)

E3G-L77 (Connector model)



E3G-ML79-G (Terminal Block Model)

E3G-ML79T-G (Terminal Block Model with Timer)



* The ON or OFF delay adjuster is not available with the E3G-ML79-G.

Operation

E3G-L/ML

Adjustment Steps

Procedure	Operation
1	Install, wire, and turn on the Sensor.
2	Perform distance setting (teaching). Refer to "Distance Setting (Teaching)".
3	Check that the mode selector is set to RUN.

Distance Setting (Teaching)

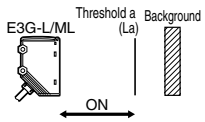
Select the most appropriate teaching method in reference to the following descriptions.

Application	Teaching without sensing objects (i.e., Teaching the background).	Setting a threshold in the middle between the background and sensing object for operation.	Detection of glossy objects in front of the background.	Setting the maximum sensing distance of the Sensor.
Teaching	Normal one-point teaching	Normal two-point teaching	Zone teaching	Maximum distance setting (in normal mode)
Setting method	Press the TEACH button with the background object.	Press the TEACH button with the background object.	Press the TEACH button with the background object (conveyor, etc.).	Press the TEACH button for longer than three seconds.
Set threshold	Threshold (a) is set to a distance in front of the background of 20% of the background distance.	Threshold (a) is set approximately in the middle between the background and sensing object.	Thresholds (a and b) are set in the sensing distance on condition that the difference between these thresholds is approximately 10% of the whole sensing distance.	The threshold is set in such manner that the stability indicator will turn ON at approximately 2 m if the sensing object is white paper.
Output ON range	The output is ON between the Sensor and La.	The output is ON between the Sensor and La.	The output is ON between La and Lb.	The output is ON whenever the sensing object is located between the Sensor and at a distance of 2.2 m.

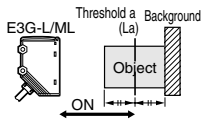
La: Distance equivalent to threshold (a)

Lb: Distance equivalent to threshold (b)

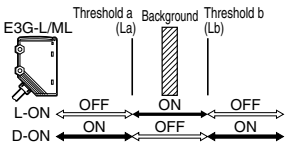
Normal Mode1. Normal One-point Teaching



2. Normal Two-point Teaching



Zone Mode Zone Teaching



Normal one-point teaching

Procedure	Operation
1	Set the mode selector to TEACH.
2	Set the NORMAL/ZONE mode selector to NORMAL.
3	Press the TEACH button with the background. The teaching indicator (red) will turn ON.
4	Set the mode selector to RUN. (Set to L-ON or D-ON mode.)

Note: Perform normal one-point teaching with the background.

Normal two-point teaching

Procedure	Operation
1	Set the mode selector to TEACH.
2	Set the NORMAL/ZONE mode selector to NORMAL.
3	Press the TEACH button with a sensing object. The teaching indicator (red) will turn ON.
4	Move the sensing object and press the TEACH button with the background. If the teaching is successful, the teaching indicator (green) will turn ON. If the teaching is not successful, the teaching indicator (red) will flash.
5	When the teaching is successful, the setting is complete. Set the mode selector to RUN. (Use the operation mode selector to set L-ON/D-ON.) When the teaching is not successful, change the work position and setting distance again, and restart the setting from step "3".

Zone teaching

Pro-ce-dure	Operation
1	Set the mode selector to TEACH .
2	Set the NORMAL/ZONE mode selector to ZONE .
3	Press the TEACH button with the background. The teaching indicator (red) will turn ON and the teaching indicator (green) will then turn ON.
4	Set the mode selector to RUN . (Set to L-ON or D-ON mode.)

Note: Perform zone teaching with the background.

Maximum distance setting (in normal mode)

If you want to set the maximum distance of the sensor, set a maximum distance as depicted in the following procedure.

Pro-ce-dure	Operation
1	Set the mode selector to TEACH .
2	Set the NORMAL/ZONE mode selector to NORMAL .
3	Press the TEACH button 3 s or more. The teaching indicator (red) will turn ON. In 3 s, the teaching indicator (green) will turn ON.
4	When the teaching indicator (green) turns ON, the setting is complete. Set the mode selector to RUN . (Set to L-ON/D-ON.)

Precautions

Correct Use

E3G-R/MR

Design

Power Supply

A full-wave rectification power supply can be used with the E3G-MR19(T)-G.

Wiring Considerations

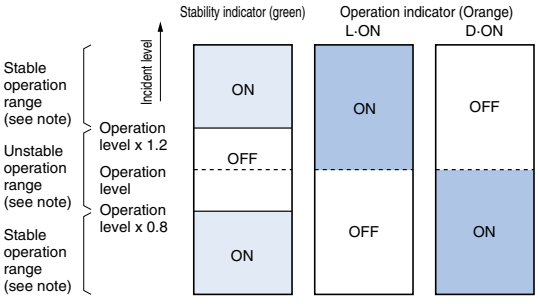
The tensile strength of the cable during operation should not exceed the values shown below.

Model	Tensile strength
E3G-R13-G E3G-MR19(T)-G	50 N max.
E3G-R17-G	10 N max.

● For adjustment

Display

- The following graphs indicate the status of each operation level.
- Set the E3G so that it will work within the stable operation range.



Note: If the operation level is set to the stable operation range, the E3G will operate with the highest reliability and without being influenced by temperature change, voltage fluctuation, dust, or setting change.

E3G-L/ML

Design

Power Supply

A full-wave rectification power supply can be used with the E3G-ML79(T)-G.

Wiring Considerations

The tensile strength of the cable during operation should not exceed the values shown below.

Model	Tensile strength
E3G-L73 E3G-ML79(T)-G	50 N max.
E3G-L77	10 N max.

Miscellaneous

EEPROM Write Error

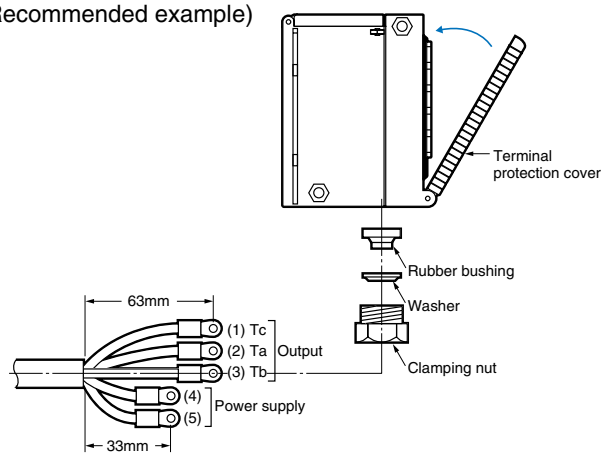
If a write error occurs (operation indicator flickers) due to power-off, static electricity or other noise in the teaching mode, perform teaching again.

E3G-M□(T)-G

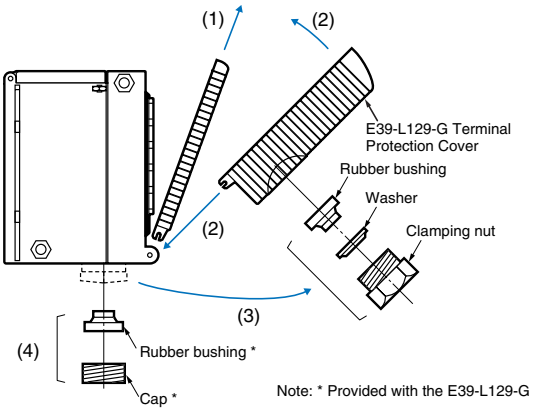
Wiring Considerations

- The cable with an external diameter of 6 to 8 mm is recommended.
- Securely tighten the cover to maintain water resistance and dust resistance. The thread size of the conduit socket is PG 13.5
- Do not tighten with the cable caught by the terminal protection cover. Otherwise, the water-resistant structure and like cannot be maintained.

(Recommended example)



- Changing to Side-pullout Cable from Vertical-pullout Cable



Procedure	Operation
①	Remove the present cover.
②	Attach the E39-L129-G Terminal Protection Cover for side-pullout cable.
③	Remove the clamping nut, washer, and rubber bushing of the E3G. These are used for the side-pullout cable.
④	Attach the rubber bushing and cap provided with the E39-L129-G to the E3G as replacements.

All E3G Models

Design

Load Relay Contact

If a load is used that will spark when it is turned OFF (e.g. a contactor or valve), the usually closed side may be turned ON before the usually open side is turned OFF or vice versa. If both usually open output and usually closed output are used simultaneously, apply an surge suppressor to the load. (Refer to OMRON's "Switch/Relay/Connector (PCB Product) Catalog" for typical examples of surge suppressors.

Wiring Considerations

Connection/Wiring

The E3G has load short-circuit protection. If load short-circuit or like has occurred, the output turns OFF. Therefore, recheck the wiring and switch power on again. This resets the short-circuit protection circuit. Load short-circuit protection is activated when a current of 2 times or more of the rated load current flows. When using an L load, use the one the inrush current of which is less than 1.2 times of the rated load current.

Mounting

- If Sensors are mounted face-to-face, ensure that no optical axes cross each other. Otherwise, mutual interference may result.
- Be sure to install the Sensor carefully so that the directional angle range of the Sensor will not be directly exposed to intensive light, such as sunlight, fluorescent light, or incandescent light.
- Do not strike the Photoelectric Sensor with a hammer or any other tool during the installation of the Sensor, or the Sensor will loose its water-resistive properties.
- Use M4 screws for Sensor installation.
- For case installation, tighten it to the torque of 1.2 Nm max.

Water Resistance

Tighten the operation cover screws and terminal block cover screws to a torque of 0.3 to 0.5 Nm in order to ensure water resistivity.

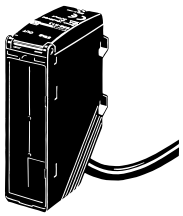
Dimensions (Unit: mm)

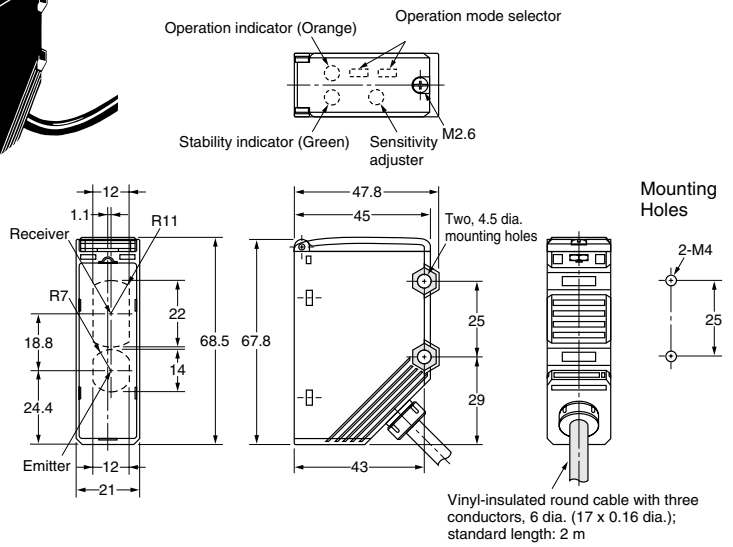
Sensors

Retroreflective Models

Pre-wired

E3G-R13-G

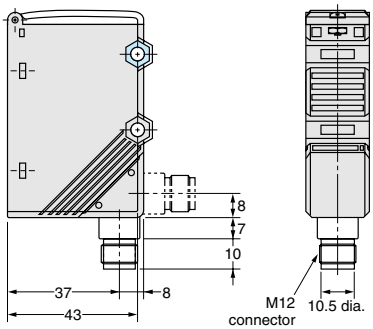




Connector type

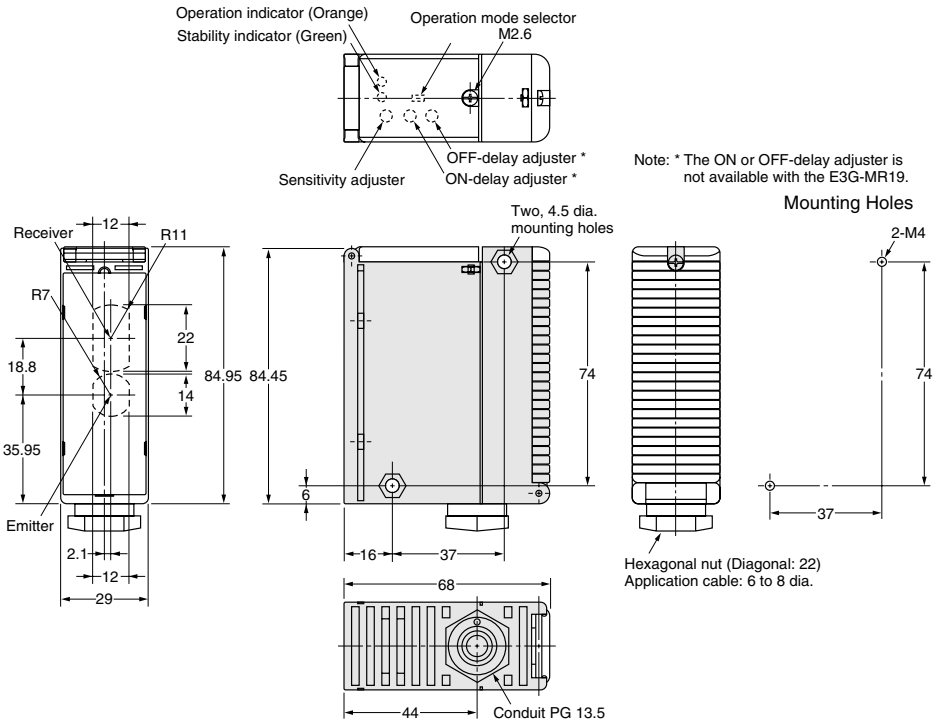
E3G-R17-G

Note: All dimensions other than the ones specified below are the same as the corresponding dimensions of E3G-R13-G.



Terminal block

E3G-MR19-G
E3G-MR19T-G

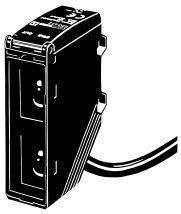


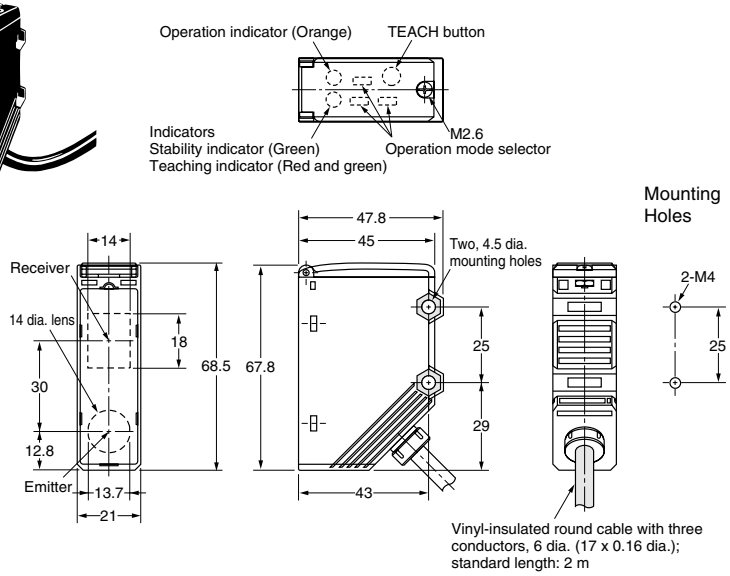
Note: * The ON or OFF-delay adjuster is not available with the E3G-MR19.

Distance-setting

Pre-wired

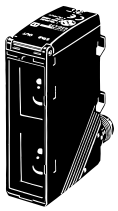
E3G-L73



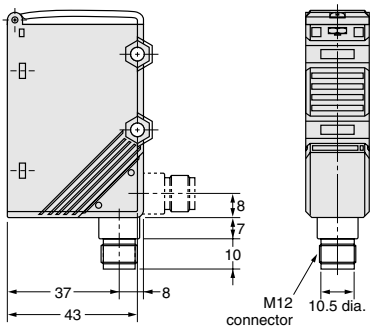


Connector type

E3G-L77

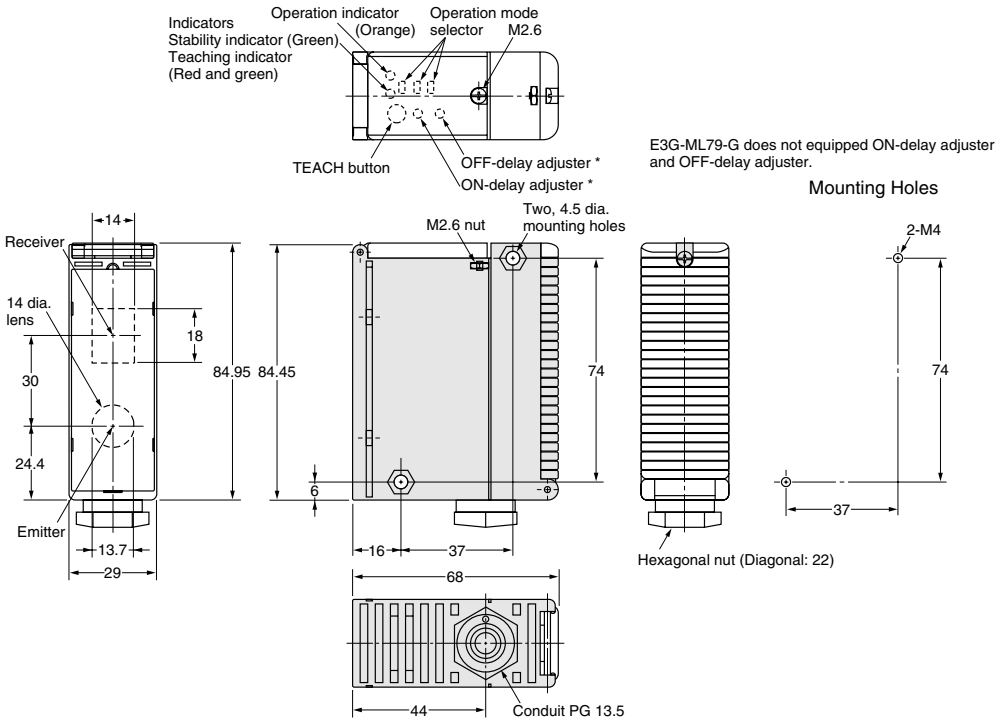


Note: The figures and dimensions not given are the same as those of E3G-L73-G shown on the left.



Terminal block

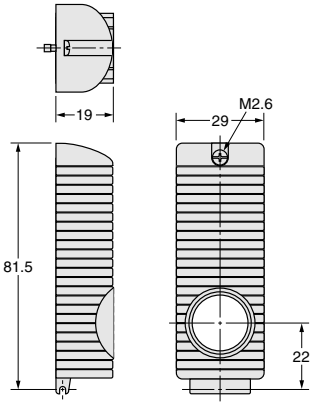
E3G-ML79-G
E3G-ML79T-G



Accessories (Order Separately)

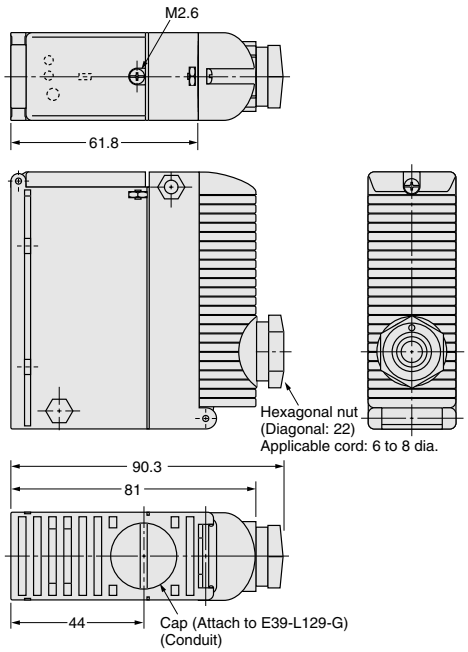
Terminal Protection Cover for Side-pullout Cable

E39-L129-G



Note: 1 . The cover is provided with a rubber bushing and cap to prevent the cable from being pulled out in vertical direction.

Terminal Protection Cover for Side-pull-out Cable (Example of E3G-MR19-G)



Reflectors and Mounting Brackets

H-3

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

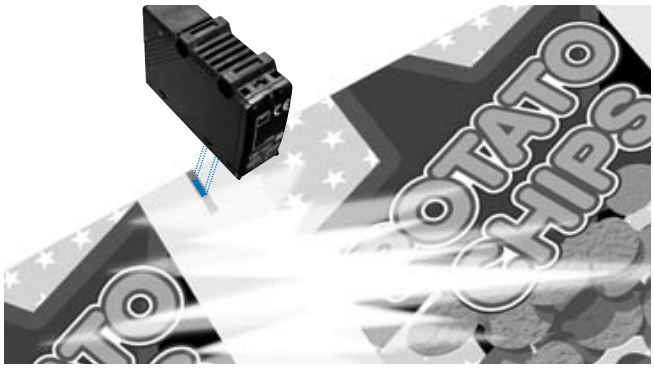
Cat. No. E278-E2-04-X In the interest of product improvement, specifications are subject to change without notice.

Mark Sensor

E3M-V

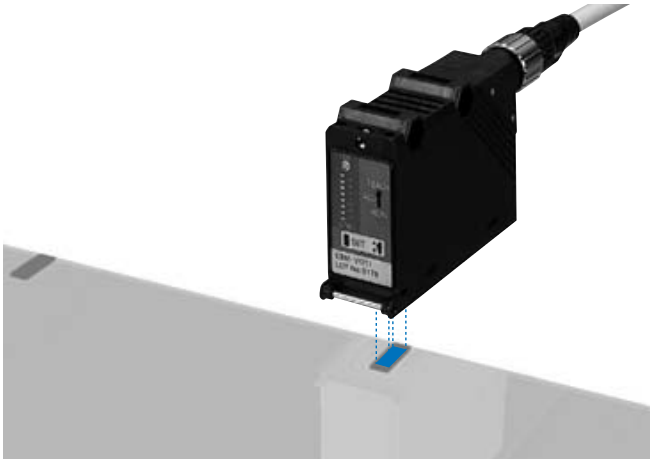
- Detects laminated or light-dispersing objects in stable operation without being influenced by mirror reflection.
- Double indication of the detection level and threshold level allows easy grasp of the operating status and easy adjustment.
- Automatically sets to the optimum threshold level while sensing objects are being conveyed and incorporates an auto-teaching function that discriminates between the mark and background and turns ON when the mark is detected.
- IP67 watertight construction with M12 rotary connector
- High response speed of 50 μs and half the size of OMRON's conventional models.

Applications



Dependably Detects Marks on Laminated Sheets

The coaxial optical system ensures a long sensing distance and stable sensing characteristics over a wide angle range, even for objects that are distance-fluctuating or leaning at an angle, or for laminated objects with marks, which conventional models have difficulty in detecting

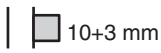
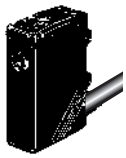


Auto-Teaching

An auto-teaching function automatically sets the threshold value upon a Remote Control input while the workpiece is moving. There is no need to position the mark at the optical spot.

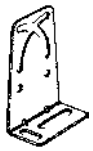
Ordering Information

Sensors

Shape	Connection method	Setting distance	Spot diameter	Model	
				NPN output	PNP output
	Connector type[1]	 10+3 mm	1 x 4 mm	E3M-VG11	E3M-VG16
			4 x 1 mm	E3M-VG21	E3M-VG26
	Pre-wired		1 x 4 mm	E3M-VG12	E3M-VG17
			4 x 1 mm	E3M-VG22	E3M-VG27

1. Possible to switch between vertical or horizontal connection using the M12 rotary connector

Mounting Brackets

Shape	Model	Quantity	Remarks
	E39-L131	1	
	E39-L132	1	For rear mounting

Sensor I/O Connectors

Shape	Type	Cord type		Model
	Single-end connector (Straight)	2 m	4-wire cord	XS2F-D421-D80-A
		5 m		XS2F-D421-G80-A
	Single-end connector (L-shaped)	2 m		XS2F-D422-D80-A
		5 m		XS2F-D422-G80-A

Specifications

Ratings/Characteristics

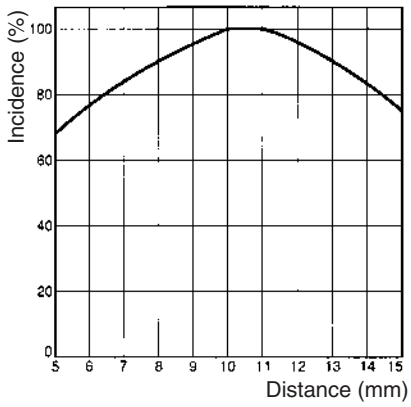
Item	E3M-VG11	E3M-VG12	E3M-VG21	E3M-VG22	E3M-VG16	E3M-VG17	E3M-VG26	E3M-VG27
Sensing distance	10±3 mm							
Spot size (W x H)	1 x 4 mm		4 x 1 mm		1 x 4 mm		4 x 1 mm	
Light source (wave-length)	Green LED (525 nm)							
Power supply voltage	10 to 30 VDC, ripple (p-p) 10% max.							
Current consumption	100 mA max.							
Control output	Load power supply voltage: 30 VDC max. Load current: 100 mA max. (Residual voltage: 1.2 V max.) NPN open collector output type				Load power supply voltage: 30 VDC max. Load current: 100 ma max. (Residual voltage: 2 V max.) PNP open collector output type			
Remote control input[1]	ON: Short-circuited to 0 or 1.5 V max. (with a flow current of 1 mA max.) OFF: Open or V_{CC} - 1.5 V to V_{CC} (with a leakage current of 0.1 mA max.)				ON: V_{CC} - 1.5 V to V_{CC} (with an absorption current of 3 mA max.) OFF: Open or 1.5 V max. (with a leakage of 0.1 mA max.)			
Remote control output[1]	Load power supply voltage: 30 VDC max. Load current: 100 mA max. (Residual voltage: 1.2 V max.) NPN open collector output type				Load power supply voltage: 30 VDC max. Load current: 100 ma max. (Residual voltage: 2 V max.) PNP open collector output type			
Bank selection	Two banks selectable. Available for remote control only. (Refer to Remote Control Function.)							
Circuit protection	Protection from reversed power supply connection and load short-circuit							
Response time	ON: 50 µs max. OFF: 70 µs max.							
Ambient illumination (on receiver lens)	Incandescent lamp: 3,000 ℓx max. Sunlight: 10,000 ℓx max.							
Ambient temperature	Operating: -20°C to 55°C/Storage: -30°C to 70°C (with no icing)							
Ambient humidity	Operating: 35% to 85%/Storage: 35% to 95°C (with no condensation)							
Insulation resistance	20 M min. (at 500 VDC)							
Dielectric strength	1,000 VAC, 50/60Hz, 1 min.							
Vibration resistance[2]	Destruction: 10 to 55 Hz, 1-mm double amplitude or 150 m/s2 for 2 hrs each in X, Y, and Z directions							
Shock resistance[3]	Destruction: 500 m/s2 3 times each in X, Y, and Z directions							
Degree of protection	IEC60529 IP67 (with protective cover)							
Connection method	Connector	Pre-wired	Connector	Pre-wired	Connector	Pre-wired	Connector	Pre-wired
Weight with package box	Approx. 100 g							
Material	Case: Polybutylene terephthalate Lens: Acrylic (PMMA)							
Others	Instruction manual							

1. Remote controll input and answer-back output share the same signal line.
2. The Sensor withstands 0.75 mm double amplitude or 100 m/s² if the mounting bracket is attached to the sensor
3. The Sensor withstands 300 m/s² if the mounting bracket is attached to the sensor.

Engineering Data

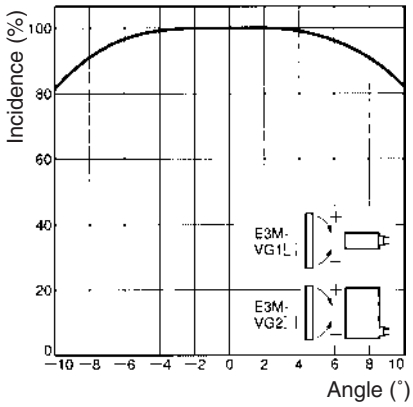
Sensing Distance vs. Incident Characteristics (Typical)

E3M-VG1□



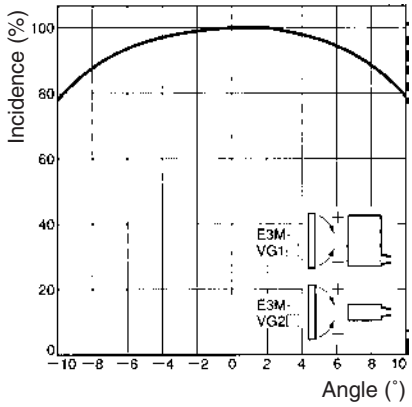
Angle vs. Incident Characteristics (X Direction)

E3M-VG1□/VG2□



Angle vs. Incident Characteristics (Y Direction)

E3M-VG1□/VG2□



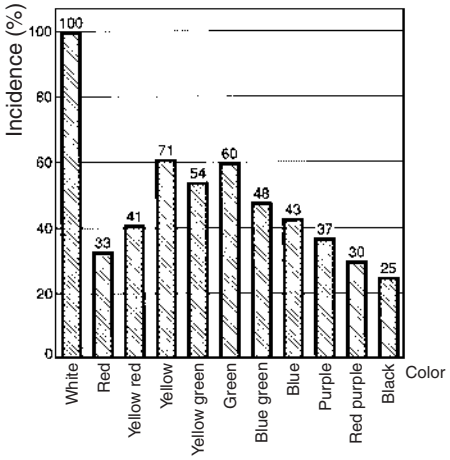
Color Sensing Capacity

E3M-VG□□

	White	Red	Yellow red	Yellow	Yellow green	Green	Blue green	Blue	Purple	Red purple	Black
White		○	○	○	○	○	○	○	○	○	○
Red	○		○	○	○	○	○	○	○	X	Δ
Yellow red	○	○		○	○	○	○	○	X	○	○
Yellow	○	○	○		○	○	○	○	○	○	○
Green yellow	○	○	○	○		○	○	○	○	○	○
Green	○	○	○	○	○		○	○	○	○	○
Blue green	○	○	○	○	○	○		Δ	○	○	○
Blue	○	○	○	○	○	○	Δ		Δ	○	○
Purple	○	○	X	○	○	○	○	Δ		○	○
Red purple	○	X	○	○	○	○	○	○	○		X
Black	○	Δ	○	○	○	○	○	○	○	X	

○: Detectable Δ: Detectable but unstable X: Not detectable

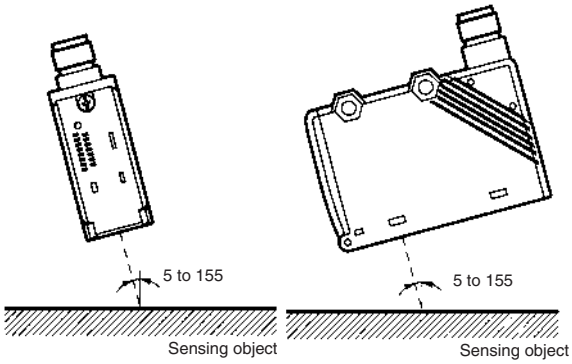
Differences in Incident by Color



Technical Guide

Glossy Sensing Objects

Incline the Sensor to detect glossy objects so that the Sensor will not be influenced by the mirror reflection of light and to ensure the stable sensing operation of the E3M-V.

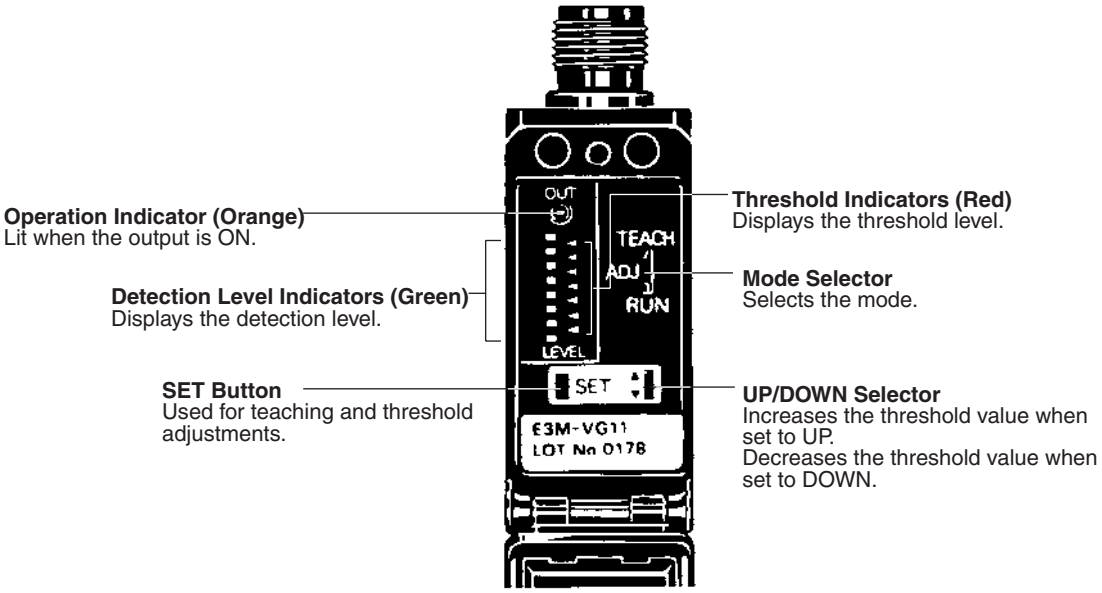


Standard Sensing Object (Color vs. Munsell)

Japan Color Enterprises Standard Color Card 230

11 standard colors	Munsell color notation
White	N9.5
Red	4R, 4.5/12.0
Yellow red	4YR, 6.0/11.5
Yellow	5Y, 8.5/11.0
Yellow green	3GY, 6.5/10.0
Green	3G, 6.5/9.0
Blue green	5BG, 4.5/10.0
Blue	3PB, 5.0/10.0
Purple	7P, 5.0/10.0
Red purple	6RP, 4.5/12.5
Black	N2.0

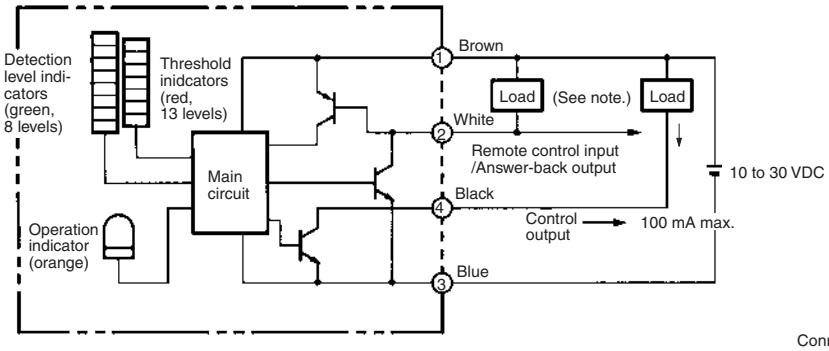
Nomenclature



Operation

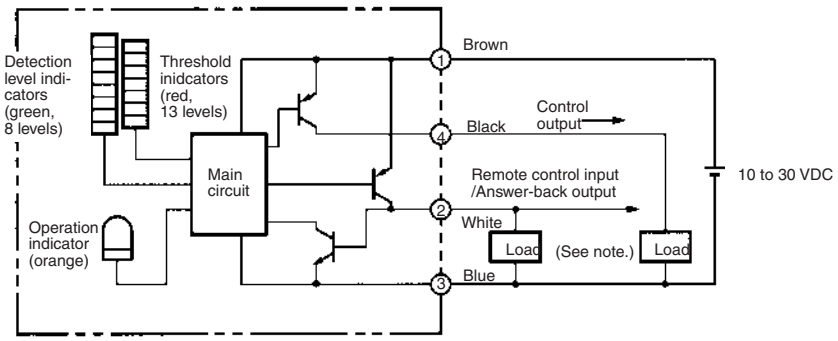
Output Circuits

NPN (E3M-VG11, E3M-VG12, E3M-VG21, E3M-VG22)



Connector Pin Arrangement

PNP (E3M-VG16, E3M-VG17, E3M-VG26, E3M-VG27)



Adjustments

Adjustment Steps

1. Install, wire, and turn ON the Photomicrosensor.
2. Perform teaching (mark registration). Refer to *Mark Registration (Teaching)*.
3. Make fine adjustments of the threshold level if necessary. Refer to *Threshold Level Adjustments* on page A-139 .
4. Check that the mode selector is set to RUN.

Mark Registration (Teaching)

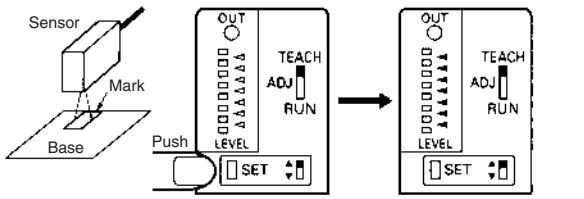
Refer to the following for ideal teaching.

Application		
The base has a color pattern. The mark and base are clearly different in color.	The base has no color pattern. The mark and base are slightly different in color.	The base has no color pattern. Remote teaching with no positioning is desired.

One-point teaching	Two-point teaching	Auto-teaching
The default level is set and the output is ON when the mark is detected.	The threshold level is set between the color of the mark and base. The output is ON when the mark is detected.	The threshold level is set between color of the mark and base. The output is ON when the mark (i.e., the color with shorter passing time) is detected.

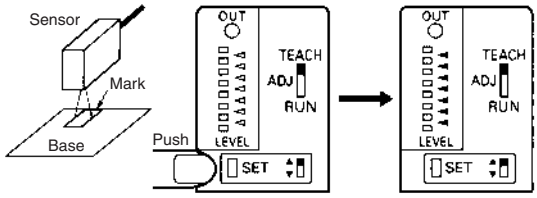
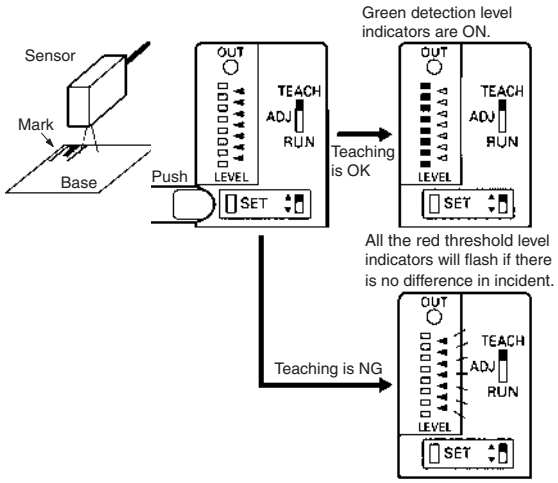
Refer to the following for each teaching method. Remote one- or two-point teaching is possible. Refer to *Remote Control Function*.

One-point Teaching

1	Set the mode selector to TEACH.
2	Locate the mark to the sensing position and press the SET button. Then all the red threshold indicators are ON.  Red threshold indicators are ON.
3	Set the mode selector to RUN. The output will be ON whenever the set mark is detected.

Note: By teaching on the base, reversed output as shown above (base: ON, mark: OFF) can be obtained.

Two-point Teaching

1	Set the mode selector to TEACH.
2	Locate the mark to the sensing position and press the SET button. All the red threshold indicators will turn ON.  Red threshold indicators are ON.
3	If teaching is successfull, move the mark and press the SET button at the base. • If teaching is successfull, all the green detection level indicators are ON. • If teaching is unsuccessfull, all the red threshold level indicator flash. 
4	If teaching is successful, set the mode selector to RUN to complete the teaching operation. If teaching is unsuccessful, restart from the above step 2.

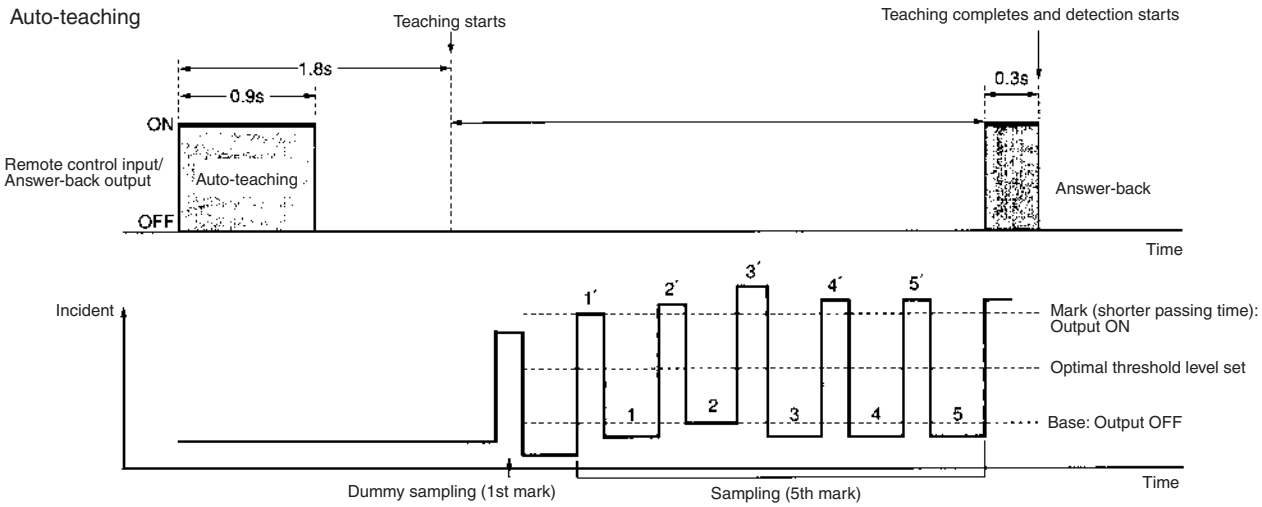
Note: Follow the above steps so that the output will be turned ON whenever the mark is detected. By taking the opposite steps, the output will be turned OFF whenever the mark is detected and turned ON whenever the base is detected.

Auto-teaching

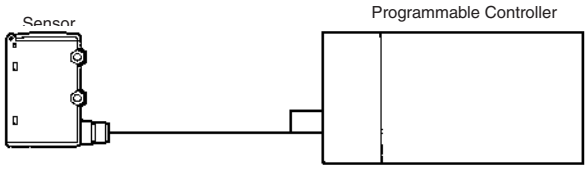
1. Check that the mode selector is set to either RUN or ADJUST.
2. Input a 0.9-s pulse signal into the remote control I/O terminal.[1]
3. Auto-teaching starts when the mark is moved. When the mark passes six times, auto-teaching completes.

- If teaching is successful, answer-back output from the remote control I/O terminal will turn ON for 0.3 s.
- If teaching is unsuccessful, no answer-back signal will be output. Readjust using two-point teaching. (Teaching will be unsuccessful if there is no difference in incident between the mark and base.)

4. If the answer-back signal is ON, the whole teaching operation will be completed. The output will be turned ON whenever the mark (i.e., the color with shorter passing time) is detected.



Example of Connection to Programmable Controller



Note: Be sure to connect the E3M-V to the Programmable Controller as shown above.

Precautions when Using Automatic Teaching

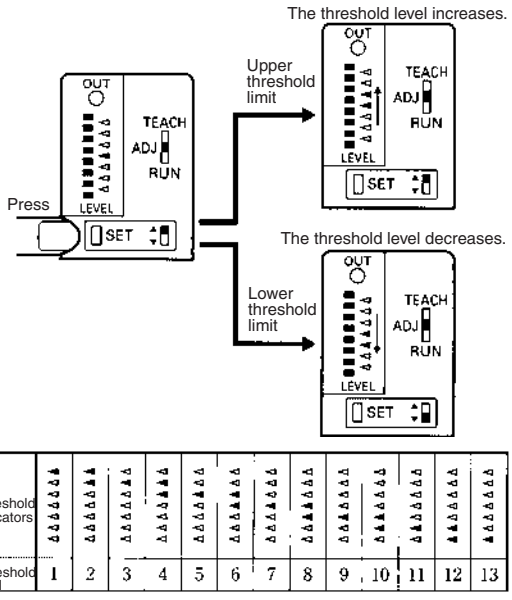
Incorrect discrimination may be caused by automatic teaching in the following cases. Use one-point or two-point teaching in such cases.

- Color patterns exist in the base.
- Sensing objects change their positions.
- Sensing objects have protrusions or surface level differences.

Threshold Level Adjustments

It is possible to make fine adjustments of the threshold level after teaching. Such fine adjustments can be made remotely as well. Refer to *Remote control Function (Bank Selection, Mark Registration, and Threshold Adjustments)* on page A-140 .

1	Set the mode selector to ADJUST
2	Select the upper or lower threshold selector. Whenever the SET button is pressed, the threshold level will move. Two indicators will be lit together when the threshold level is an even level.
3	After setting the level, set the mode selector to RUN.



[1] Make sure that the input tolerance of each pulse is within ±0.1 s.

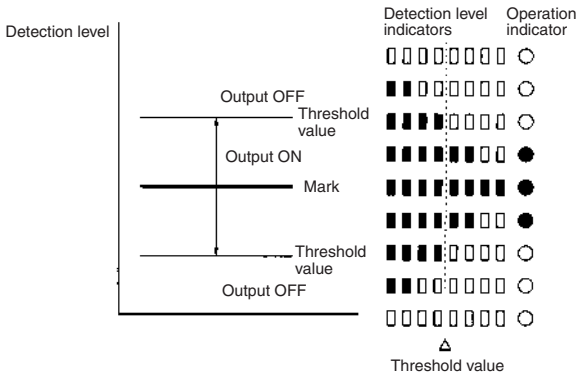
Detection Level Indicator

Detection Level Indicator

The control output of the E3M-V will be turned ON if the detection level exceeds the threshold level. The indication of the detection level varies with the teaching method.

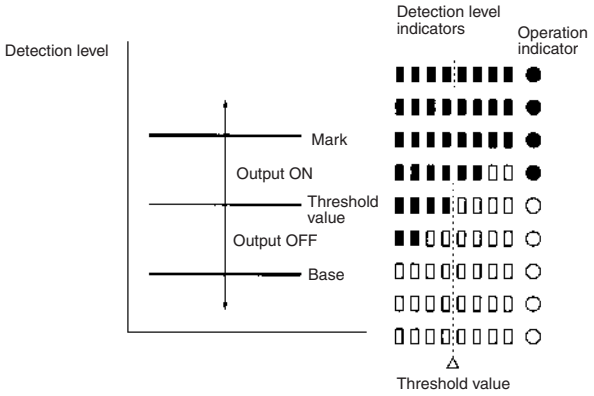
One-point Teaching

The upper and lower threshold values are set on the basis of the mark and the detection level indicators indicate the degree of color conformity to the mark's color.



Two-point or Auto-teaching

A single threshold value is set between the mark (registered first) and the base (registered next). The detection level indicators indicate the tolerance between the mark and base.

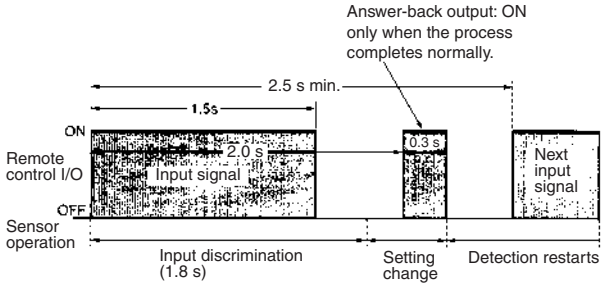


Remote control Function (Bank Selection, Mark Registration, and Threshold Adjustments)

Under Run Mode or Adjust Mode

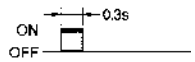
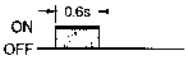
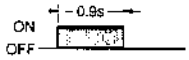
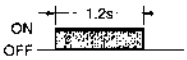
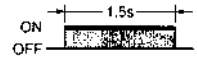
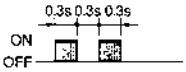
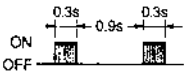
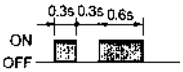
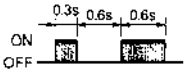
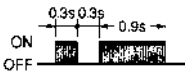
The input of any of the signals listed in the following table into the remote control I/O terminal allows remote control of the E3M-V. When the signal is accepted, answer-back output will be turned ON for 0.3 s. Only in the case of one-point teaching, however, can the signal be manually input, provided that the input is ON for 1.5 s or more.

Timing Chart



Note: If Signals are sent continuously, make sure that there is an interval of 2.5 s between signal inputs as shown above.

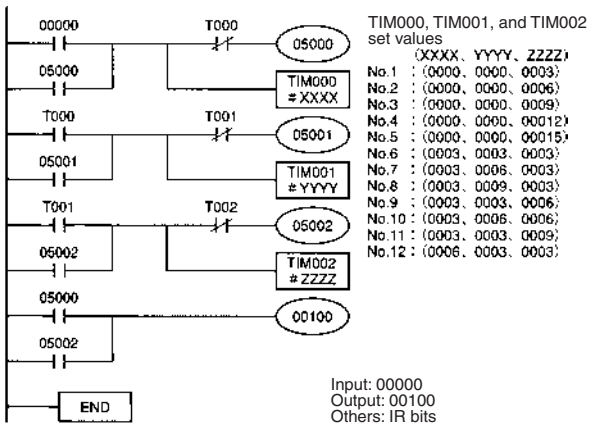
Control Signals

No.	Control signal	Function
1		Bank 1 is selected (operation indicator OFF in TEACH mode)
2		Bank 2 is selected (operation indicator ON in TEACH mode)
3		Auto-teaching
4		Two-point teaching (1st and 2nd)
5		One-point teaching (or input for 1.5 s min.)
6		Threshold level 1 is selected.
7		Threshold level 3 is selected.
8		Threshold level 5 is selected.
9		Threshold level 7 is selected.
10		Threshold level 9 is selected.
11		Threshold level 11 is selected.
12		Threshold level 13 is selected.

Note: The input error of each signal pulse must be within ± 0.1 s

Ladder Program Example

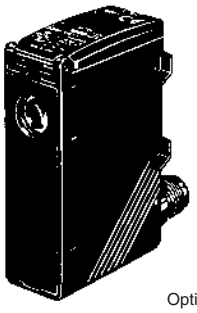
Control signals are input by a ladder program as shown below.



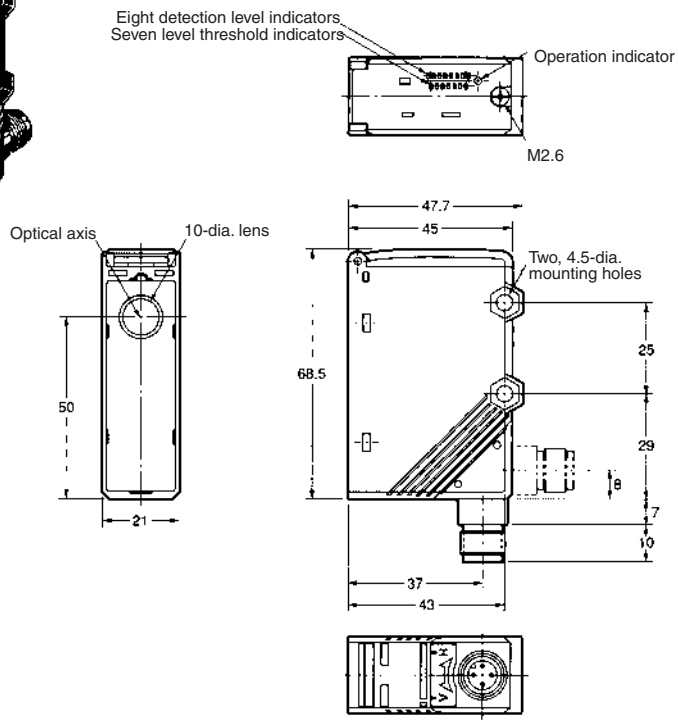
Dimensions

Note: All units are in millimeters unless otherwise indicated.

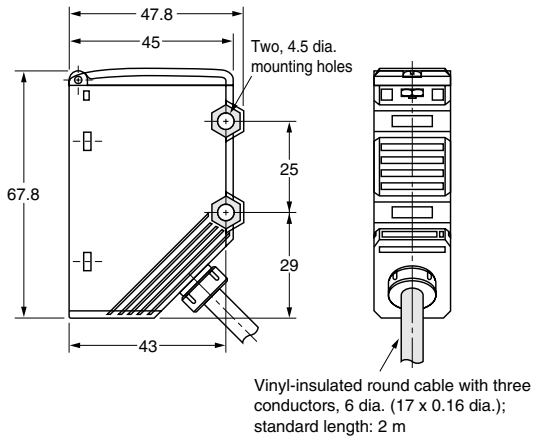
Mark Sensors



Connector Models



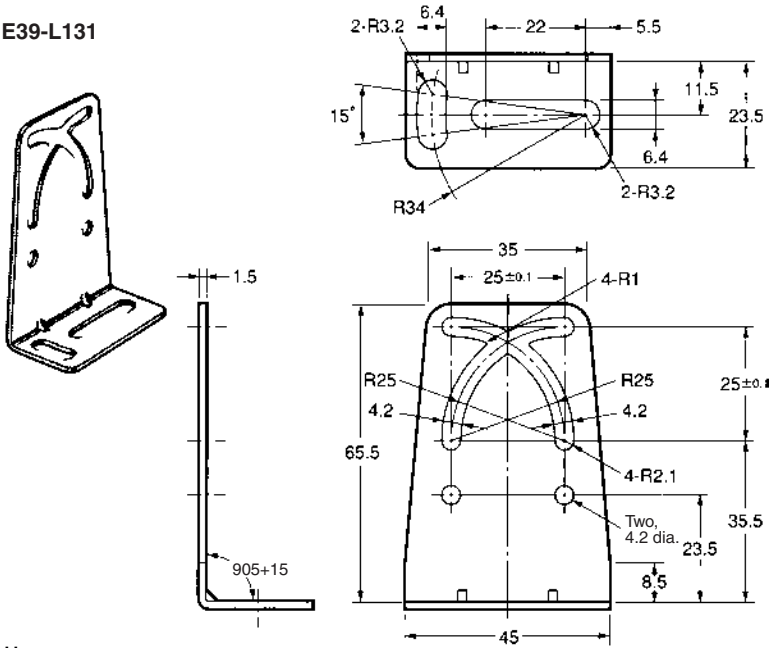
Pre-Wired Models



Accessories (Order Separately)

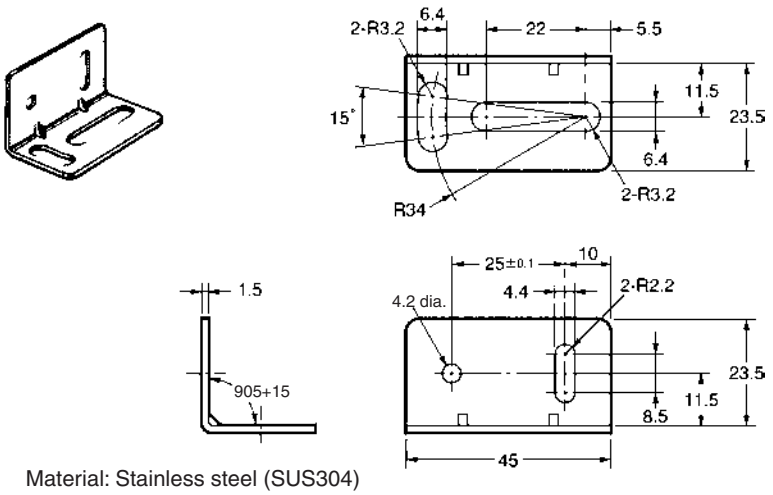
Mounting Brackets

E39-L131



Material: Stainless steel (SUS304)

E39-L132

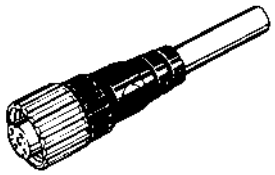


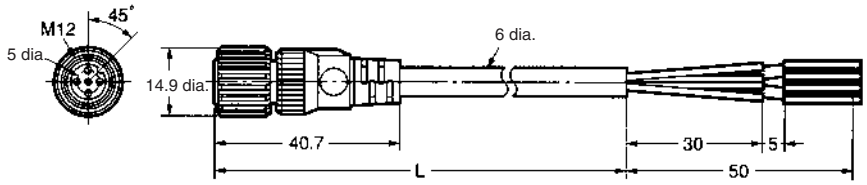
Material: Stainless steel (SUS304)

Sensor I/O Connectors

Single-end Connector (Straight Model)

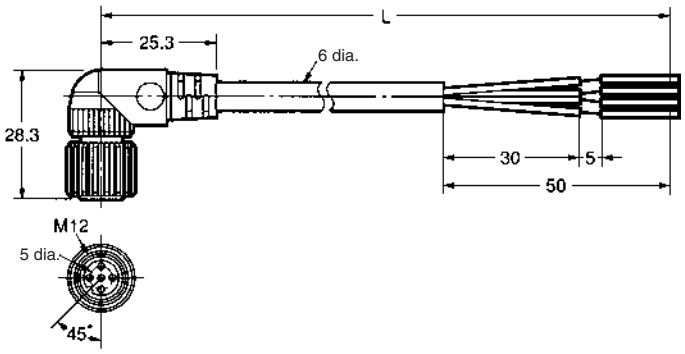
XS2F-D421-D80-A (L=2 m)
XS2F-D421-G80-A (L=5 m)





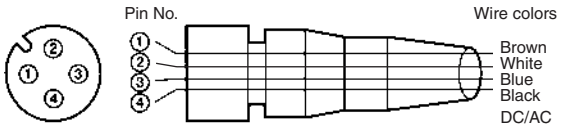
Single-end Connector (L-shaped Model)

XS2F-D422-D80-A (L=2 m)
XS2F-D422-G80-A (L=5 m)



Installation

Sensor I/O Connector



Note: 1 . pin No. 2 is not used.
2 . For details, refer to the *Sensor I/O Connectors Catalog (X065)*

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

Precautions

Observe the following precautions to ensure safety.

- Do not use the Sensor in locations subject to flammable or explosive gases.
- Do not use the Sensor in water or conductive solution.
- Do not disassemble, repair, or modify the Sensor.
- Use the Sensor under proper power supply specifications such as the use of AC or DC power supply.
- Do not apply any voltage or current exceeding the rated level.
- Be careful with the power supply polarities and wire correctly.
- Connect the loads correctly.
- Do not short-circuit both ends of loads.

Correct Use

Installation

Power Reset Time

Since the E3M-V is ready to detect objects from 100 ms max. after the E3M-V is turned ON, operate the remaining devices 100 ms after the Sensor is turned ON. If power is supplied to the E3M-V and the load independently, be sure to turn on the E3M-V first.

Power OFF

The E3M-V may output a single pulse when the control power supply is turned OFF. If the E3M-V is connected to a timer or counter to which power is supplied from an independent power supply, the E3M-V will be more likely to output a single pulse when the control power supply is turned OFF. Therefore, supply power to the timer or counter from the same power supply for the E3M-V.

Power Supply Type

No full-wave or half-wave rectified power supplies can be connected to the E3M-V.

Power Supply Connection

Be sure to ground the FG (frame ground) and G (ground) terminals if a switching regulator is connected to the E3M-V, otherwise the E3M-V may malfunction due to the switching noise of the switching regulator.

Wiring

Cable

The cable can be extended up to 100 m provided that the thickness of the cable is 0.3 mm2 minimum.

Repeated Cable Bending

The cable must not be bent repeatedly.

High-tension Lines

The power supply lines of the Sensor must not be wired alongside power lines or high-tension lines in the same conduit, otherwise the Sensor may become damaged or malfunction due to induction noise that may be generated from the power lines or high-tension lines. Route the lines separately or in a single conduit.

Cable Pulling Force

Do not pull cables with pulling forces exceeding 50N.

Mounting

Screw Tightening

Make sure that the casing is tightened to a maximum torque of 1.2 N o m.

Mounting Direction

When Sensors are mounted to face each other, make sure to adjust the optical axes so that the Sensors will not be mutually interfered.

Others

EEPROM Write Error

An EEPROM error may result if power supply to the Sensor fails or the Sensor is influenced by static noise, in which case the threshold level indicators will flash. Perform the teaching and threshold level setting of the E3M-V again.

M12 Metal Connector

Make sure to connect or disconnect the metal connector after turning off the E3M-V.

Make sure to hold the connector cover when connecting or disconnecting the metal connector.

Tighten the metal connector securely by hand. Do not use any tool, such as pliers, otherwise the metal connector may be damaged.

If the metal connector is not tightened securely, the metal connector may be disconnected by vibration and the proper degree of protection of the E3M-V may not be maintained.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E280-E2-01A-X In the interest of product improvement, specifications are subject to change without notice.

Printed Circuit Board Sensor

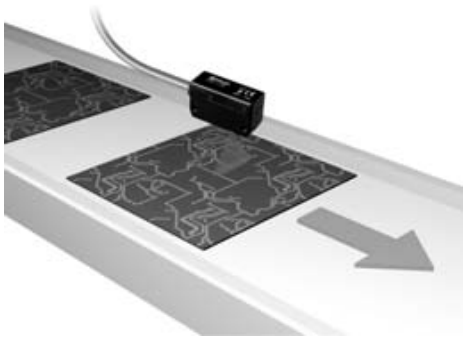
E3S-LS3

Printed circuit board sensor capable of stable detection without being affected by holes or notches.

- Suitable for incorporation in devices (E3S-LS3□).
- Wide range is suitable for component boards with high or irregularly shaped components (E3S-LS3□W).

Applications

Detecting for PCBs



Transparent Film Sheet Detection

Detection for Wafer-cassette Mounting

Ordering Information

Red light

Sensor type	Shape	Connection method	Detection distance *	Timer function	Model	Output
Limited reflective		Pre-wired (2 m)	20 to 35 mm	Without	E3S-LS3N	NPN Light ON
			10 to 60 mm		E3S-LS3NW	
		Pre-wired (2 m)	20 to 35 mm	Without	E3S-LS3P	PNP Light ON
				With	E3S-LS3PT	
		Pre-wired M8 3-pin connector (0.3 m)		Without	E3S-LS3P-M5J	
				With	E3S-LS3PT-M5J	
		Pre-wired M8 4-pin connector (0.3 m)		Without	E3S-LS3P-M3J	
				With	E3S-LS3PT-M3J	
		Pre-wired (2 m)	10 to 60 mm	Without	E3S-LS3PW	
				With	E3S-LS3PWT	
		Pre-wired M8 3-pin connector (0.3 m)		Without	E3S-LS3PW-M5J	
				With	E3S-LS3PWT-M5J	
		Pre-wired M8 4-pin connector (0.3 m)		Without	E3S-LS3PW-M3J	
				With	E3S-LS3PWT-M3J	

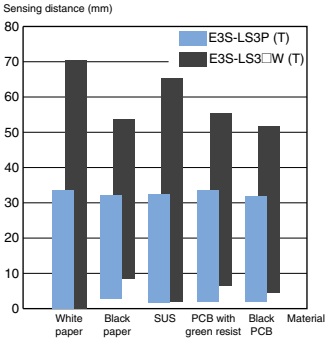
* Using 80 x 80 mm white art paper

Rating/performance

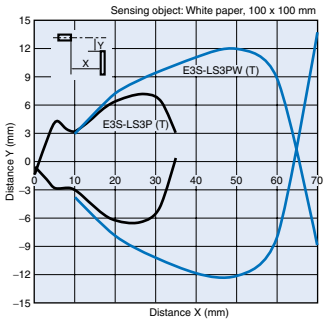
Item \ Sensor type / Model		Limited reflective			
		E3S-LS3□	E3S-LS3PT	E3S-LS3□W	E3S-LS3PWT
Sensing	White art paper	20 to 35 mm		10 to 60 mm	
	Black paper *	20 to 30 mm		15 to 50 mm	
Light source (wave length)		Red LED (660 nm)			
Power supply voltage		12 to 24 VDC±10%, ripple (p-p) 10% max.			
Current consumption		25 mA max.			
Control output		Load power supply voltage: 24 VDC max.; Load current: 100 mA max., Residual voltage: 2 V max.; Operating mode: Light ON			
Response time		1 ms max. for operation and reset respectively			
Timer function		Available with E3S-LS3P(W)T models only. Time range: 0.1 to 1.0 s (adjustable)			
Ambient illuminance		Receiver side: Incandescent lamp: 5,000 lux max.			
Ambient temperature		Operating: -10 to 55°C (with no icing or condensation)			
Ambient humidity		Operating:35% to 85% (with no condensation)			
Insulation resistance		20 MΩ min. (at 500 VDC) between charged parts and the case			
Dielectric strength		1,000 VAC at 50/60 Hz for 1 minute between charged parts and the case			
Vibration resistance		10 to 55 Hz with a 1.5-mm double amplitude for 2 hrs each in X, Y and Z directions			
Shock resistance		500 m/s^2, 3 times each in X, Y and Z directions			
Protective structure		IEC60529 IP40			
Connection method		Pre-wired (standard length: 2 m)/Pre-wired M8 connector (standard length: 0.3 m)			
Indicators		Operation indicator (orange)			
Weight (Packed state)		Pre-wired models: Approx. 80 g; Pre-wired M8 connector: Approx. 45 g			
Material	Case	ABS			
	Lens	Acrylic			
Accessories		Instruction sheet, M3 screws,			

Characteristic data (typical)

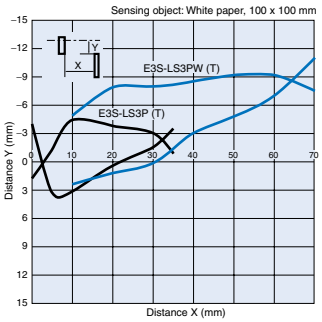
Sensing Distance vs. Materials



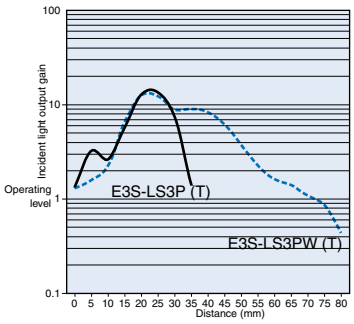
Operating Range (Left and Right)



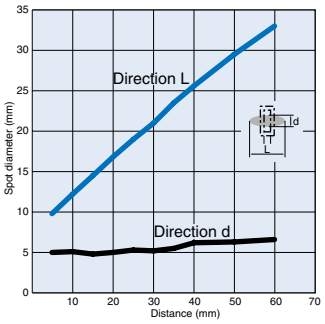
Operating Range (Up and Down)



Output vs. Set Distance

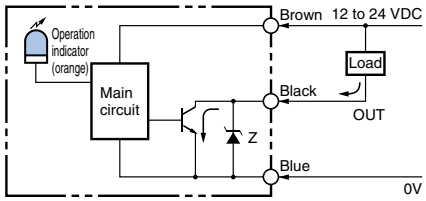


Spot Diameter vs. Sensing Distance



Output Circuit Diagram

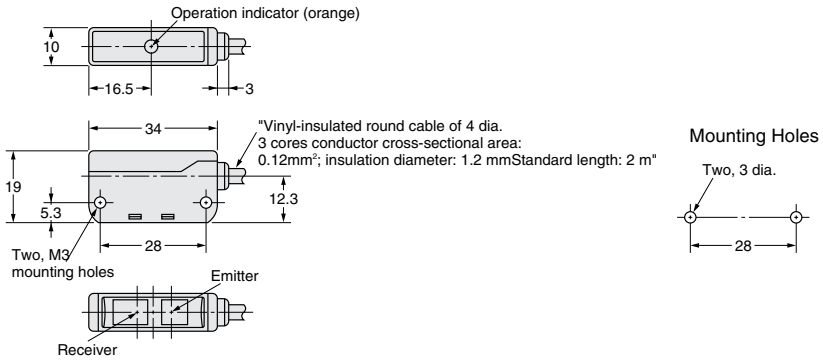
NPN output (PNP output will be available soon)

Model	Operating status of output transistor	Timing chart	Output circuit
E3S-LSN3 E3S-LS3NW	Light ON	Incident Interrupted Operation indicator (orange) ON / OFF Output transistor ON / OFF	
E3S-LS3P E3S-LS3PW		Incident light No Incident light Operation indicator (orange) ON / OFF Output transistor ON / OFF	
E3S-LS3PT E3S-LS3PWT		Incident light No Incident light T Operation indicator (orange) ON / OFF Output transistor ON / OFF T: Off-delay timer (0.1 to 1.0 s)	

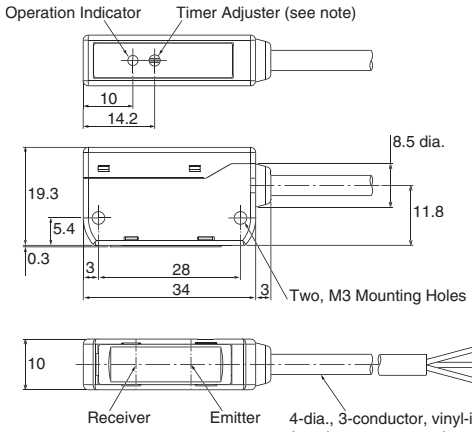
Dimensions (Unit: mm)

Note: All units are in millimeters unless otherwise indicated.

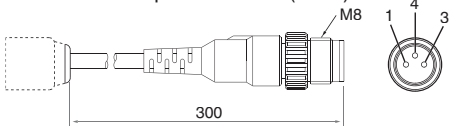
E3S-LS3N
E3S-LS3NW



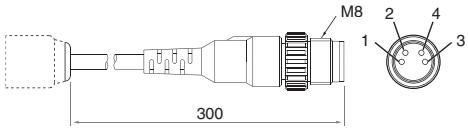
E3S-LS3□(T)(-M5J/-M3J)
E3S-LS3□W(T)(-M5J/-M3J)



Pre-wired M8 3-pin connector (-M5J)

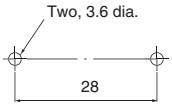


Pre-wired M8 4-pin connector (-M3J)



Terminal number	Specifications	
	-M5J	-M3J
1	+V	+V
2	–	Open
3	0 V	0 V
4	Output	Output

Mounting Holes



Note: The Timer Adjuster is only for the E3S-LS3PT and E3S-LS3PWT.

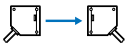
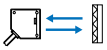
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E223-E2-01-X

All voltage photoelectric sensors

E3JK

- Built-in amplifier accepts wide supply voltage range.
- Slim, space-saving construction measures only 50 x 50 x 17.4 mm.
- Relay outputs with long life expectancy and high switching capacity (3 A, 250 V AC).
- Polarized retroreflective type available for glossy or shiny object detection.

Sensor type	Shape	Connection method	Sensing distance	Output form	Output		Model
Through-beam		Pre-wired models	5m	Light ON	Relay output		E3JK-5M1
				Dark ON			E3JK-5M2
				Light ON/ Dark ON (selectable)	DC transistor output		NPN: E3JK-5S3
Retroreflective model (with M.S.R. function)			* 2.5m (3m)	Light ON	Relay output		E3JK-R2M1
				Dark ON			E3JK-R2M2
				Light ON/Dark ON (selectable)	DC transistor output	NPN	E3JK-R2S3
						PNP	E3JK-R2R3
Retroreflective model (without M.S.R. function)			* 4m (5m)	Light ON	Relay output		E3JK-R4M1
				Dark ON			E3JK-R4M2
				Light ON/Dark ON (selectable)	DC transistor output (NPN)		E3JK-R4S3
Diffuse-reflective			300mm	Light ON	Relay output		E3JK-DS30M1
				Dark ON			E3JK-DS30M2
				Light ON/Dark ON (selectable)	DC transistor output (NPN)		E3JK-DS30S3

* The value within the parentheses indicates the sensing distance applied when the E39-R2 reflector is used.

Note: The UL-listed model ends with "-US". (Example: E3JK-5M1-US). Note that the DC transistor type of the E3JK is UL-unlisted.

Accessories (Order Separately)

Slits

Slit width	Sensing distance		Minimum sensing object (typical)	Model	Quantity	Remarks
Width 1 mmx20 mm	E3JK-5□□	0.7 m	1 mm dia.	E39-S39	1 pc. each for emitter and receiver (total 2 pcs.)	(Seal type long slit) Can be used with the through-beam model E3JK-5□□.

Reflectors

Name	Sensing distance (typical)		Model	Quantity	Remarks
Reflectors	E3JK-R2□□	2.5 m (rated value)	E39-R1	1	Attached to the E3JK-R2□□. Attached to the E3JK-R4□□.
	E3JK-R4□□	4 m (rated value)			
	E3JK-R2□□	3 m	E39-R2	1	---
	E3JK-R4□□	5 m			
Small reflector	E3JK-R2□□	1 m (5 mm) *	E39-R3	1	---
Tape Reflector	E3JK-R2□□	750 mm (200 mm) *	E39-RS1	1	The M.S.R. function is available.
	E3JK-R2□□	1.2 m (200 mm) *	E39-RS2		
	E3JK-R2□□	1.5 m (200 mm) *	E39-RS3		

* Values in parentheses indicate the minimum required distance between the sensor and reflector.
Note: When the reflector used is other than the supplied one, set the sensing distance to about 0.7 times of the typical example as a guideline.

Mounting Brackets

Shape	Model	Quantity	Remarks
	E39-L40	1	Supplied with E3JK

Note: If a through-beam model is used, order two Mounting Brackets for the emitter and receiver respectively.

Rating/Performance

E3JK

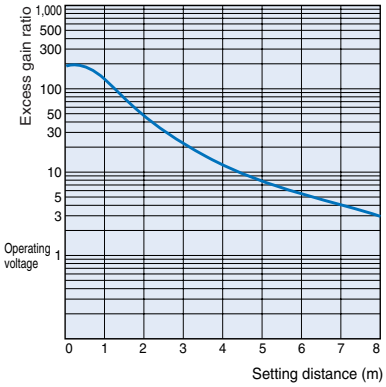
Item \ Sensor type	Model	Through-beam		Retroflective model (with M.S.R. function)		Retroflective model (without M.S.R. function)		Diffuse-reflective	
		E3JK-5M□	E3JK-5S3	E3JK-R2M□	E3JK-R2□3	E3JK-R4M□	E3JK-R4S3	E3JK-DS30M□	E3JK-DS30S3
Sensing distance		5 m		2.5 m (When using the E39-R1)		4 m (When using the E39-R1)		300 mm (White paper 100x100 mm)	
Standard sensing object		Opaque 14.8 dia. min.		Opaque: 75 mm dia. min.				---	
Differential distance		---						20% max. of sensing distance	
Directional angle		Both emitter and receiver: 3°C to 20°C		1° to 5°				---	
Light source (wave length)		Infrared LED (950 nm)		Red LED (660 nm)				Infrared LED (950 nm)	
Power supply voltage		12 to 240 VDC ±10% ripple (p-p) : 10% max. 24 to 240 VAC ±10% 50/60 Hz							
Current consumption	DC	3 W max.		2 W max.					
	AC	3 W max.		2 W max.					
Control output		Relay output: 250VAC 3 A (cos =1) max., 5 VDC 10 mA min.	DC SSR Negative common 48 VDC 100 mA max. Leak current 0.1 mA max. With load short-circuit protection	Relay output: 250VAC 3 A (cos =1) max., 5 VDC 10 mA min.	DC SSR Negative or positive common 48 VDC 100 mA max. Leak current 0.1 mA max. With load short-circuit protection	Relay output: 250VAC 3 A (cos =1) max., 5 VDC 10 mA min.	DC SSR Negative common 48 VDC 100 mA max. Leak current 0.1 mA max. With load short-circuit protection	Relay output: 250VAC 3 A (cos =1) max., 5 VDC 10 mA min.	DC SSR Negative common 48 VDC 100 mA max. Leak current 0.1 mA max. With load short-circuit protection
Life expectancy (relay output)	Mechanical	50 million times or more (switching frequency 18,000 times/hour)							
	Electrical	100 thousand times or more (switching frequency 18,000 times/hour)							
Response time		30 ms max.	10 ms max.	30 ms max.	5 ms max.	30 ms max.	5 ms max.	30 ms max.	5 ms max.
Sensitivity adjustment		---						Single-turn adjustment	
Ambient illuminance		Incandescent lamp: 3,000 lux max.							
Ambient temperature		Operating: -25°C to 55°C, Storage: -30°C to 70°C (with no icing or condensation)							
Ambient humidity		Operating: 45% to 85%RH, Storage: 35% to 95%RH (with no condensation)							
Insulation resistance		20 M min. at 500 VDC							
Dielectric strength		1,500 VAC at 50/60 Hz for 1 minute							
Vibration resistance	Destruction	10 to 55 Hz, 1.5 mm double amplitude for 2 hours each in X, Y, and Z directions							
	Malfunction	10 to 55 Hz, 1.5 mm double amplitude for 2 hours each in X, Y, and Z directions							

Item	Sensor type / Model	Through-beam		Retroflective model (with M.S.R. function)		Retroflective model (without M.S.R. function)		Diffuse-reflective	
		E3JK-5M□	E3JK-5S3	E3JK-R2M□	E3JK-R2□3	E3JK-R4M□	E3JK-R4S3	E3JK-DS30M□	E3JK-DS30S3
Shock resistance	Destruction	Destruction: 500 m/s^2 for 3 times each in X, Y, and Z directions							
	Malfunction	Destruction: 100m/s^2 (approx. 10G) 3 times each in X, Y, and Z directions	Destruction: 500 m/s^2 for 3 times each in X, Y, and Z directions	Destruction: 100m/s^2 (approx. 10G) 3 times each in X, Y, and Z directions	Destruction: 500 m/s^2 for 3 times each in X, Y and Z directions	Destruction: 100m/s^2 (approx. 10G) 3 times each in X, Y, and Z directions	Destruction: 500 m/s^2 for 3 times each in X, Y, and Z directions	Destruction: 100m/s^2 (approx. 10G) 3 times each in X, Y, and Z directions	Destruction: 500 m/s^2 for 3 times each in X, Y, and Z directions
Protective structure		IEC60529 IP64							
Connection method		Pre-wired models (standard length: 2 m)							
Weight (Packed state)		Approx. 420 g		Approx. 250 g					
Material	Case	ABS							
	Lens	Acrylics							
	Mounting bracket	Steel							
Accessories		Mounting bracket (with screws), nuts, instruction manual, reflector (retroreflective model only)							

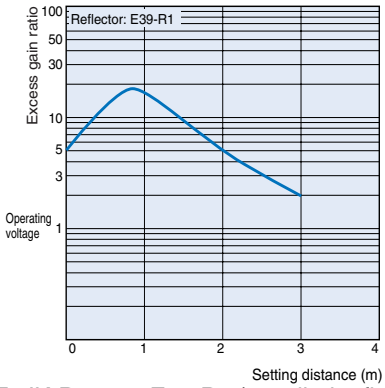
Characteristic data (typical)

Excess Gain Ratio vs. Setting Distance

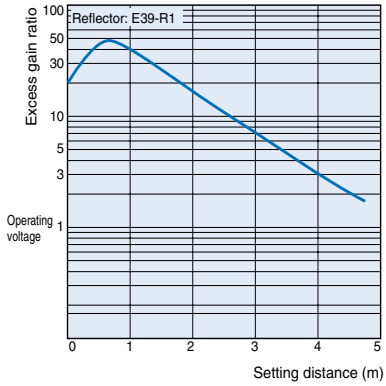
Through-beam model
E3JK-5□□



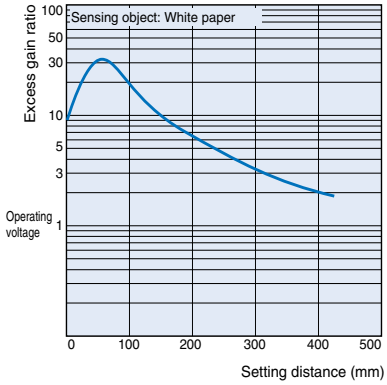
Retroreflective Models
E3JK-R2□□ + E39-R1 (supplied reflector)



E3JK-R4□□ + E39-R1 (supplied reflector)



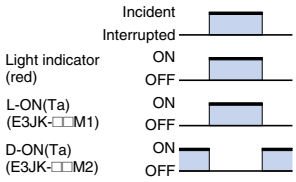
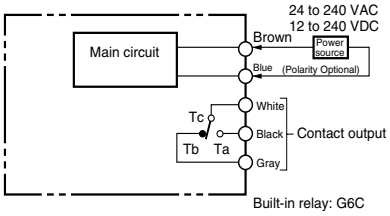
Diffuse-reflective
E3JK-DS30□□



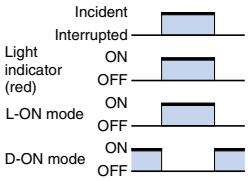
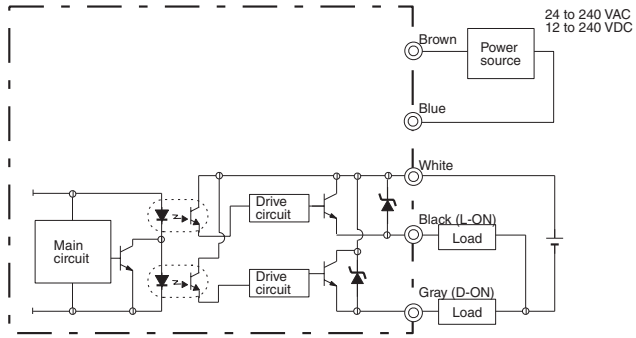
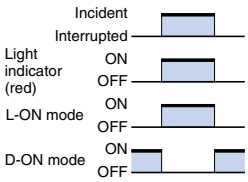
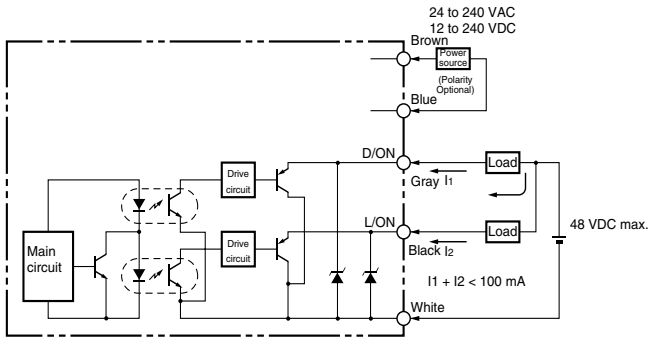
Output Circuit Diagram

E3JK

Relay output

Model	Timing chart	Output circuit
E3JK-5M1 E3JK-5M2 E3JK-R2M1 E3JK-R2M2 E3JK-R4M1 E3JK-R4M2 E3JK-DS30M1 E3JK-DS30M2		

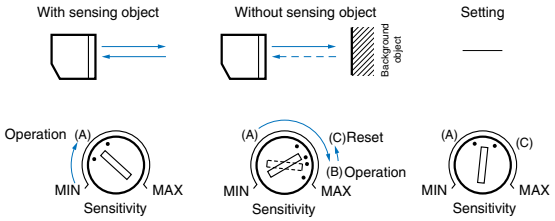
DC transistor output

Model	Timing chart	Output circuit
E3JK-5S3 E3JK-R2S3 E3JK-R4S3 E3JK-DS30S3		
E3JK-R2R3		 Note: The output stage leakage currents are 0.1 mA max., respectively.

Note: Connect to brown and blue on the emitter side.

Operation

Adjustment

Item / Model	Through-beam	Retroreflective Models	Diffuse-reflective
E3JK	Swing the receiver and emitter vertically and/or horizontally and set the adjuster in the center of the range where the indicator of the receiver turns ON.	Like the through-beam model, adjust the reflector and emitter/receiver. Since the directional angle of the emitter/receiver is 1 to 5°, adjust the emitter/receiver especially carefully.	 (1) If you have a sensing object as shown in the figure, turn the sensitivity adjuster clockwise (increase the sensitivity) until the indicator is turned ON, and define this adjuster position as (A). (2) Remove the sensing object, turn the sensitivity adjuster clockwise until the indicator is turned ON by a background object, and define this position as (B). (3) Turn the sensitivity adjuster counterclockwise (decrease the sensitivity) from (B) until the indicator is turned OFF, and define this position as (C). (4) The position in the middle of (A) and (C) is the optimum position. If the indicator is not turned ON by the background object at the maximum sensitivity, set the adjuster in the middle of (A) and maximum sensitivity. The sensitivity adjuster may be damaged if an excessive force is applied.

Precautions

Correct Use

E3JK

Design

Power Reset Time

The Sensor is ready to detect an object within 200 ms after it is turned ON. If Sensor and load are connected to separate power supplies, ensure to turn ON the Sensor first.

Wiring Considerations

Connection/Wiring

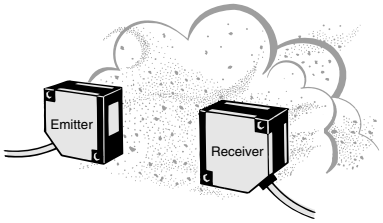
If the DC transistor output type is used, the sum of load currents of L-ON output (NO) and D-ON output (NC) should be within 100 mA. If the sum of load currents exceeds 100 mA, the load short-circuit protection may be activated. (The load short-circuit protection is reset by turning OFF the power of the photoelectric sensor.)

Miscellaneous

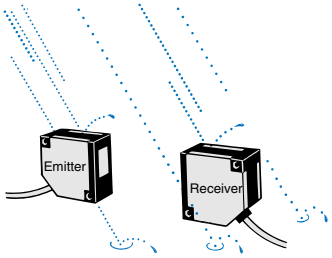
Ambient Conditions (Installation Area)

The E3JK will malfunction if installed in the following places.

- Places where the E3JK is exposed to a dusty environment.
- Places where corrosive gases are produced.



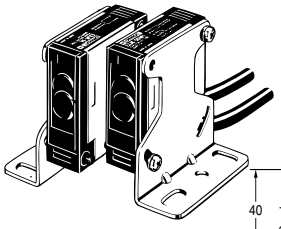
- Places where the E3JK is directly exposed to water, oil, or chemicals.



Dimensions (Unit: mm)

Sensors

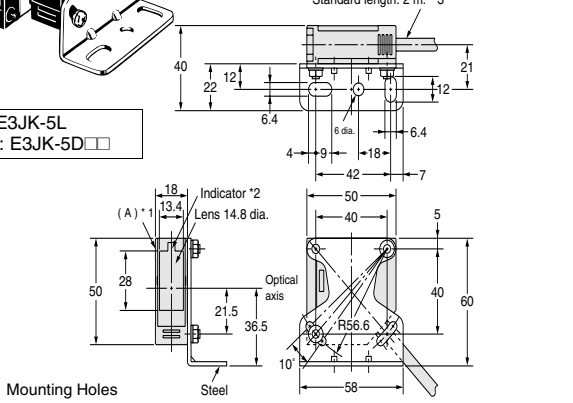
E3JK-5□□



Emitter: E3JK-5L
Receiver: E3JK-5D□□

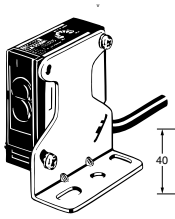
With Mounting Bracket Attached

6-dia., 5-conductor, vinyl-insulated round cable (conductor cross-sectional area: 0.3 mm²; insulation diameter: 1.5 mm). Standard length: 2 m. * 3



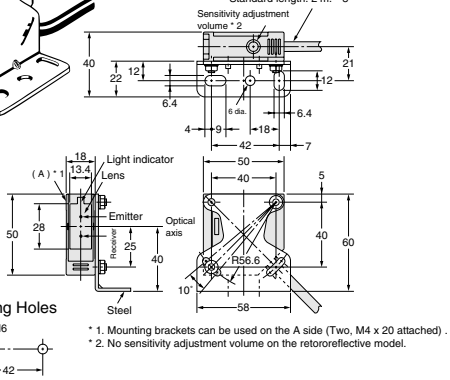
* 1.Mounting brackets can be used on the A side (Two, M4 x 20 attached) .
* 2.Emitter: Power indicator
Receiver: Light indicator
* 3.Emitter includes 2-conductor.

E3JK-R2□□
E3JK-R4□□
E3JK-DS30□□



With Mounting Bracket Attached

6-dia., 5-conductor, vinyl-insulated round cable (conductor cross-sectional area: 0.3 mm²; insulation diameter: 1.5 mm). Standard length: 2 m. * 3



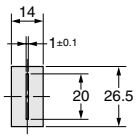
* 1. Mounting brackets can be used on the A side (Two, M4 x 20 attached) .
* 2. No sensitivity adjustment volume on the retororeflective model.

Accessories (Order Separately)

Seal type long slit (for E3JK)

E39-S39

Material: Polyester
0.1 mm thick



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E027-E2-09-X

Transparent bottle sensor

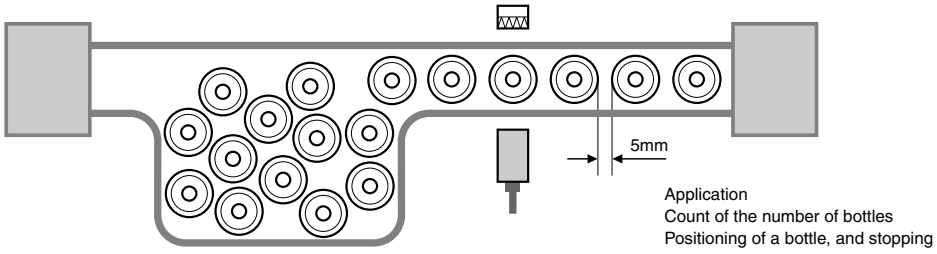
E3S-CR62/67

Ideal for detecting transparent glass and plastic containers

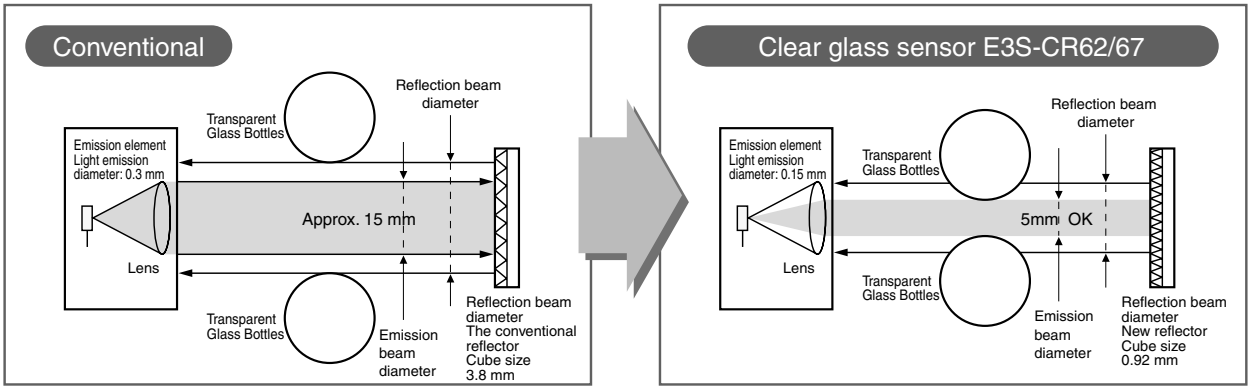
Features

Stable operation even if container interval is shortened for higher productivity.

Stable detection of 5 mm gaps that previous regression reflection models were unable to detect because of a speed increase for higher productivity.



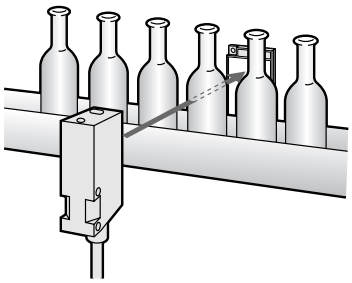
Bottle detection seen from the upper side



Application

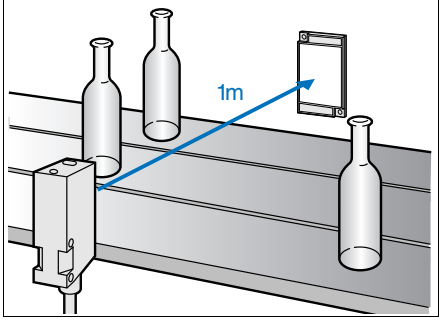
Narrow pin interval detection

Stable detection of 5 mm gaps that are not detectable by previous regression reflection models.



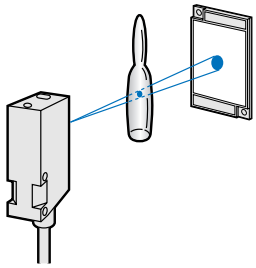
Wide detection range. Stable detection even at long distances.

Use of hyper-point LED as light source (1/2 light emission diameter of previous models) enables stable long-distance detection.



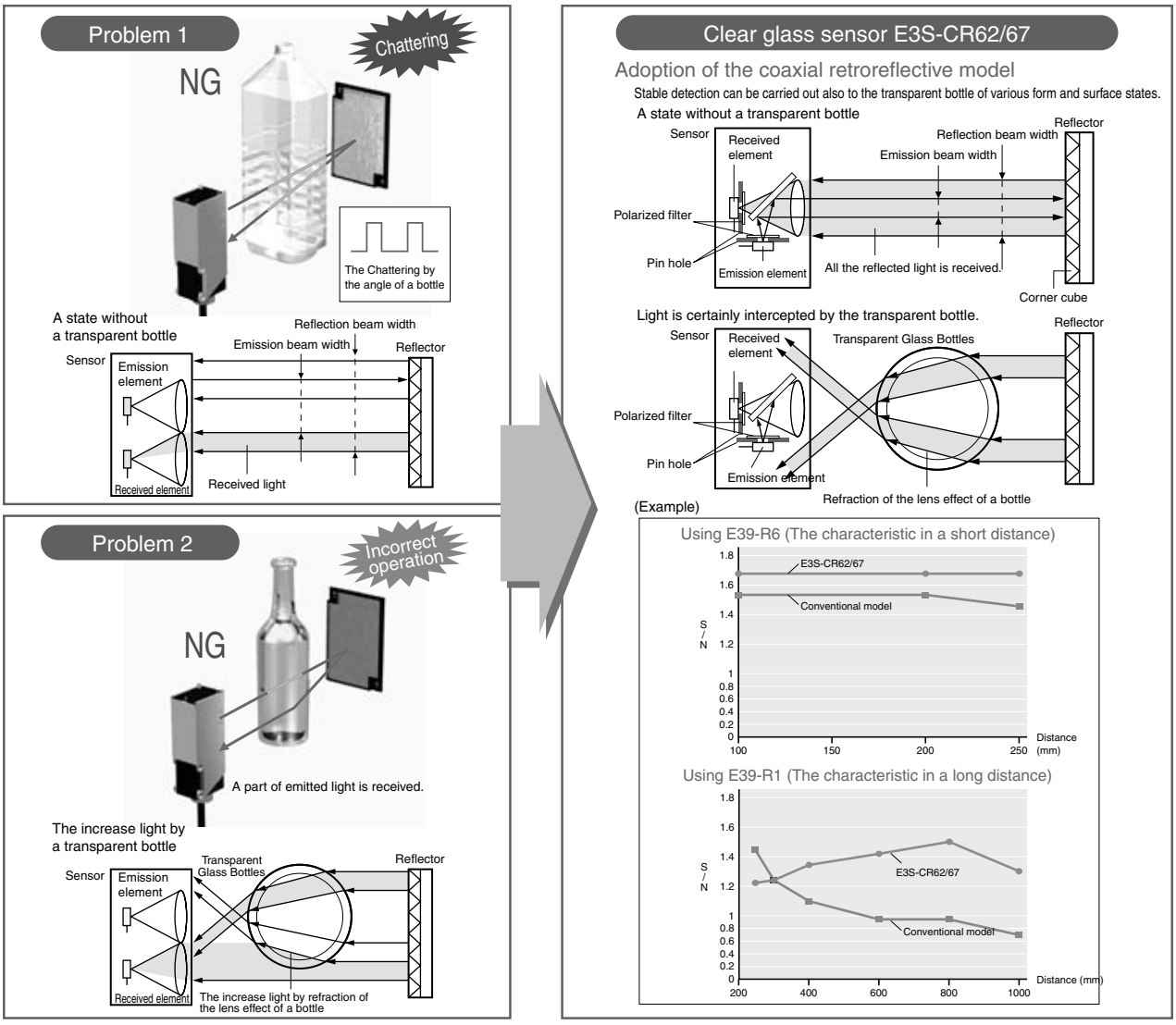
Stable detection of ampules and other small containers.

Visible spotlight for easy adjustment.



Features

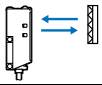
We significantly increased the S/N ratio to enable a stable detection of PET bottles and various other transparent containers



Ordering Information

Sensors

Red light

Sensor type	Shape	Connection method	Sensing distance		Model
			Reflector E39-R6	Reflector E39-R1	
Retroreflective Models		Pre-wired type	250mm	1m [250mm] *	E3S-CR62-C
		Connector type			E3S-CR67-C

* Values in parentheses indicate the minimum required distance between the sensor and reflector.

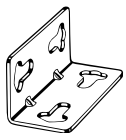
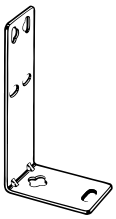
Accessories (Order Separately)

Reflectors

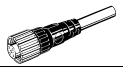
Name	Sensing distance	Model	Quantity	Remarks
Reflectors	250 mm	E39-R6	1	---
	1 m (250 mm) *	E39-R1	1	

* Values in parentheses indicate the minimum required distance between the sensor and reflector.

Mounting Brackets

Shape	Model	Quantity	Remarks
	E39-L103	1	Supplied with the product.
	E39-L87	1	---

Sensor I/O Connectors

Cable	Shape	Cable length		Model
Standard cable	Straight 	2 m	3-wire type	XS2F-D421-DC0-A
		5 m		XS2F-D421-GC0-A
	L-shape 	2 m		XS2F-D422-DC0-A
		5 m		XS2F-D422-GC0-A

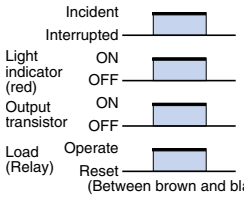
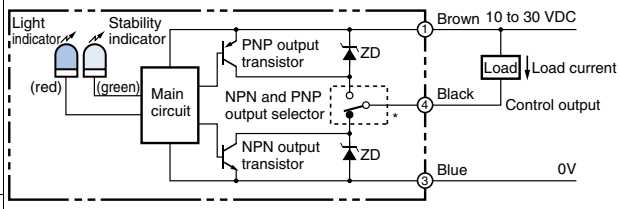
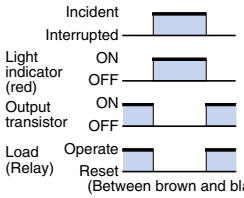
Rating/performance

Item \ Sensor type / Model		Retroreflective Models (M.S.R. function)	
		E3S-CR62-C	E3S-CR67-C
Sensing distance		250 mm (When using the E39-R6), 1 m (250 mm)*1 (When using the E39-R1)	
Standard sensing object		30 mm dia. X 150 mm glass tube (thickness: 1.8 mm)	
Directional angle		2 to 6°	
Light source (wave length)		Red LED (660 nm)	
Power supply voltage		10 to 30 VDC, ripple (p-p) : 10 % max.	
Current consumption		40 mA max.	
Control output		Load supply voltage: 30 VDC or less; load current 100 mA or less (residual voltage: NPN output 1.2 V or less, PNP output 2 V or less); open collector model (NPN/PNP output switching) light ON / dark ON switching	
Protective circuits		Load short protection, reverse connection protection, mutual interference protection function	
Response time		Operation or reset: 1 ms max.	
Sensitivity adjustment		2-turn endless adjuster (with indicator)	
Ambient illuminance		Incandescent lamp: 5,000 lux max. Sunlight 10,000 lux max.	
Ambient temperature		Operating: -25°C to 55°C, Storage: -40°C to 70°C (with no icing or condensation)	
Ambient humidity		Operating: 35% to 85% RH, Storage: 35% to 95% RH (with no icing or condensation)	
Insulation resistance		20 M min. at 500 VDC	
Dielectric strength		1,000 VAC at 50/60 Hz for 1 minute	
Vibration resistance		Destruction:10 to 2,000 Hz,1.5 mm double amplitude or 300 m/s^2 (approx. 30G) for 0.5 hrs each in x, y, and Z directions	
Shock resistance		1000 m/s^2 (approx. l00G) 3 times each in X, Y, and Z directions	
Protective structure		IEC Standard IP67 NEMA 6P (restricted to indoor use) *2	IEC Standard IP67 NEMA 6P (restricted to indoor use)
Connection method		Pre-wired models (standard length: 2 m)	Connector type
Weight (Packed state)		Approx. 115 g	Approx. 80 g
Mate-rial	Case	Zinc diecast	
	Lens	Acrylics	
	Display opera-tion panel	Polyethyl sulfon	
	Mounting Brackets	Stainless steel (SUS304)	
Accessories		Brackets (with screws), adjustment driver, operation manual	

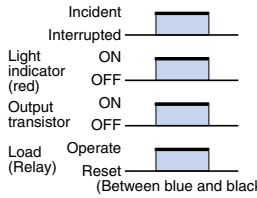
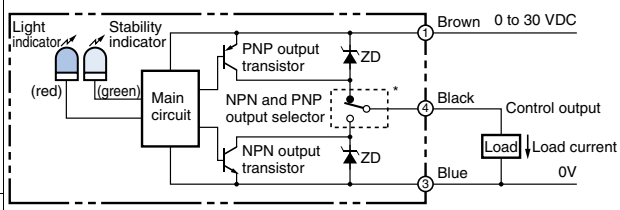
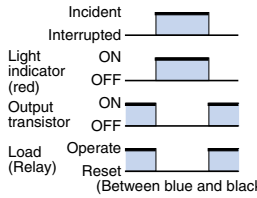
*1. Values in parentheses indicate the minimum required distance between the sensor and reflector.
*2. NEMA (National Electrical Manufacturers Association) Standard

Output Circuit Diagram

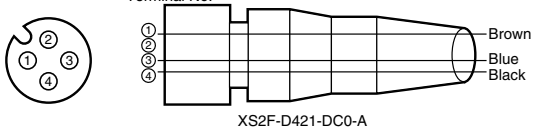
NPN output

Model	Operating status of output transistor	Timing chart	Mode selection switch	Output circuit
E3S-CR62-C E3S-CR67-C	Light ON		L ON (LIGHT ON)	 * Please make a changeover switch into the NPN side. Connector Pin arrangement  Note: Pin 2 is not used.
	Dark ON		D ON (DARK ON)	

PNP output

Model	Operating status of output transistor	Timing chart	Mode selection switch	Output circuit
E3S-CR62-C E3S-CR67-C	Light ON		L ON (LIGHT ON)	 * Please make a changeover switch into the NPN side. Connector Pin arrangement  Note: Pin 2 is not used.
	Dark ON		D ON (DARK ON)	

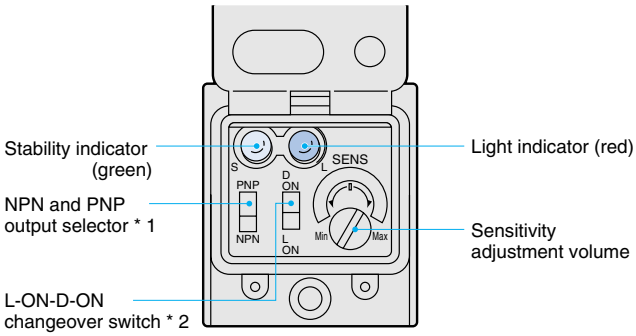
Connectors (Sensor I/O connectors)



Class	Wire, outer	Connector pin	Application
For DC	Brown	①	+V
	-	②	-
	Blue	③	0V
	Black	④	Output

Note: Pin 2 is open.

Nomenclature

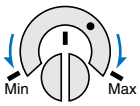
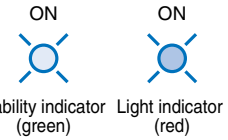
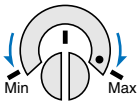
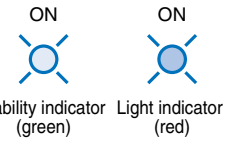


*1. Output transistor switching is possible by means of NPN/PNP output switch.
*2. Operation mode can be switched using L ON/D ON switch.

Operation

Sensitivity adjustment

The light source switch and reflective plate can be moved horizontally and vertically to set them in the center of the illumination area of the red incident light indicator lamp, allowing the operator to check whether the green stability indicator lamp is illuminated.

Sensing object	Detection state	Sensitivity adjuster	Indicator state	Adjustment procedure
Transparent pin or glass plate	Without sensing object			Turn sensitivity control from minimum to maximum and set at point where incoming light stabilizes.
Opaque object	Object detected, object not detected			If the object is larger than the lens diameter, set the sensitivity control to the maximum setting. If the object is the same size or smaller, turn the sensitivity control from minimum to maximum and set at point where incoming light stabilizes.

Precautions

Correct Use

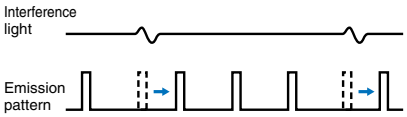
Design

Fuzzy mutual interference prevention

- If the light source switches for the reflective plates are arranged in a row, light from a neighboring light source switch may be received, causing erroneous light reception signals and errors.
- The fuzzy reciprocal interference prevention function monitors interference light for a certain period of time before illumination, and gathers data on the strength of the interference light and the frequency of incidence. It then determines the risk of error due to these two factors using fuzzy logic and controls the timing of illumination to reduce the risk.

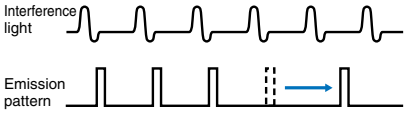
(When risk is low)

- Light is emitted after interfering light is gone.



(In case of high risk)

- Light is emitted after shifting to a gap of interfering light.



Bottles

In some cases, factors such as the shape of a bottle prevent stable detection. Please confirm that a correct detection is performed before use.

Wiring Considerations

Cable

- An oil resistant cable is used to ensure oil resistance. Avoid repeated bending of the cable.
- The bending radius should be 25 mm or more.

Avoiding Malfunctions

When using a photoelectric switch with an inverter or sub-motor, be sure to connect FG (frame ground pin) and G (ground pin). If not connected, errors may result.

Installation

Sensor installation

- When installing a photoelectric switch, avoid tapping with a hammer. This may damage the water resistance function.
- Use an M4 screw, tightened to a torque of no more than 1.18 Nm.

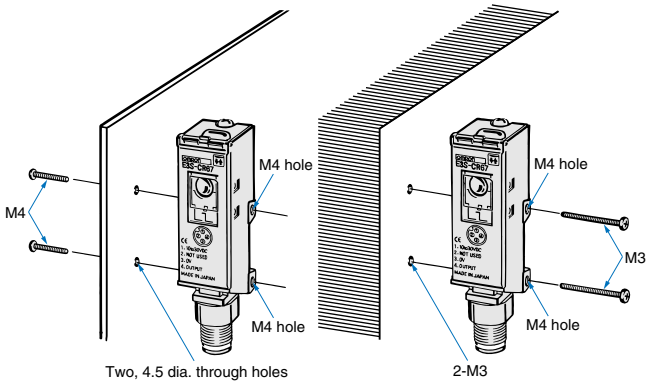
(When using the mounting bracket)

- To set the sensor on the mechanical axis, use the optical axis locking holes.
- When it is not possible to mount on the mechanical shift, move the photoelectric switch vertically or horizontally so that it is located in the center of the area illuminated by the incident light indicator lamp. Verify that the stability indicator lamp is on.

(Direct installation)

Install the photoelectric switch as shown in the following diagram.

Tighten M4 screw Tighten M3 screw



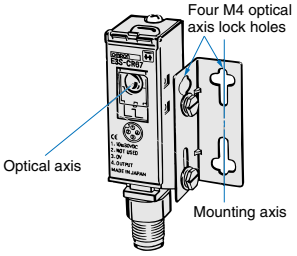
● For adjustment

Light axis adjustment

Adjust the optical axis of the clamp to the direction of detection object approach. The optical axis of the photoelectric switch is the same as the mounting axis of the clamp, enabling easy adjustment.

Optical axis locking hole

By fitting screws into the optical axis locking holes, the mounting bracket is set onto the mounting shaft of the mounting bracket.



Dimensions (Unit: mm)

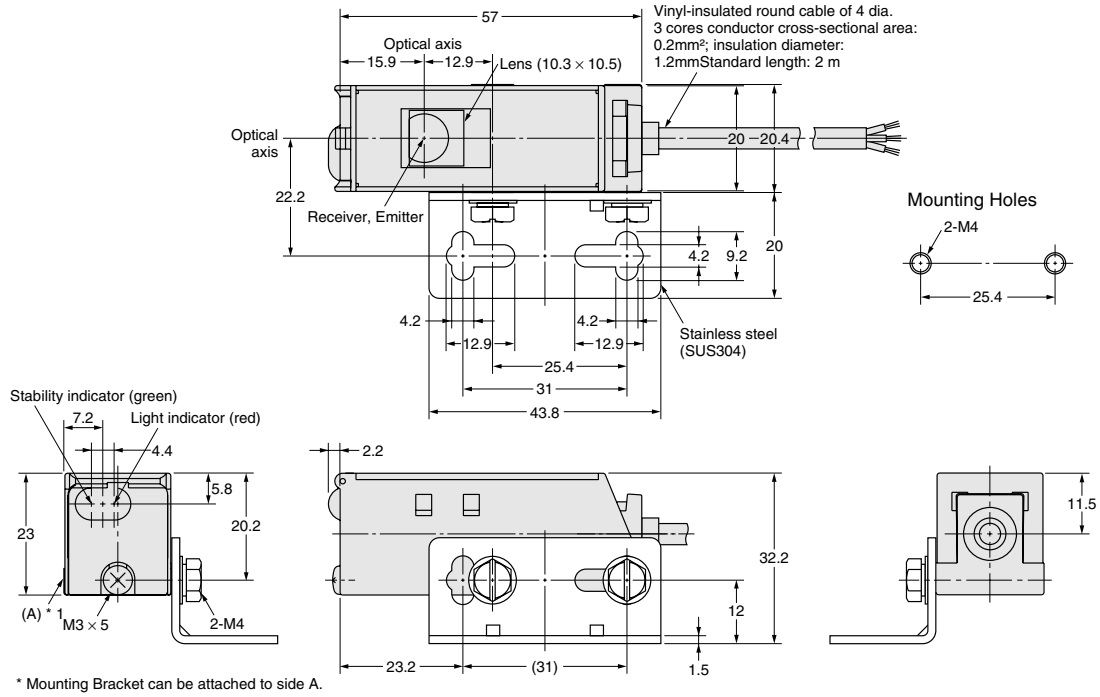
Sensors

Retroreflective Models

Pre-wired

E3S-CR62-C

With Mounting Blanket Attached

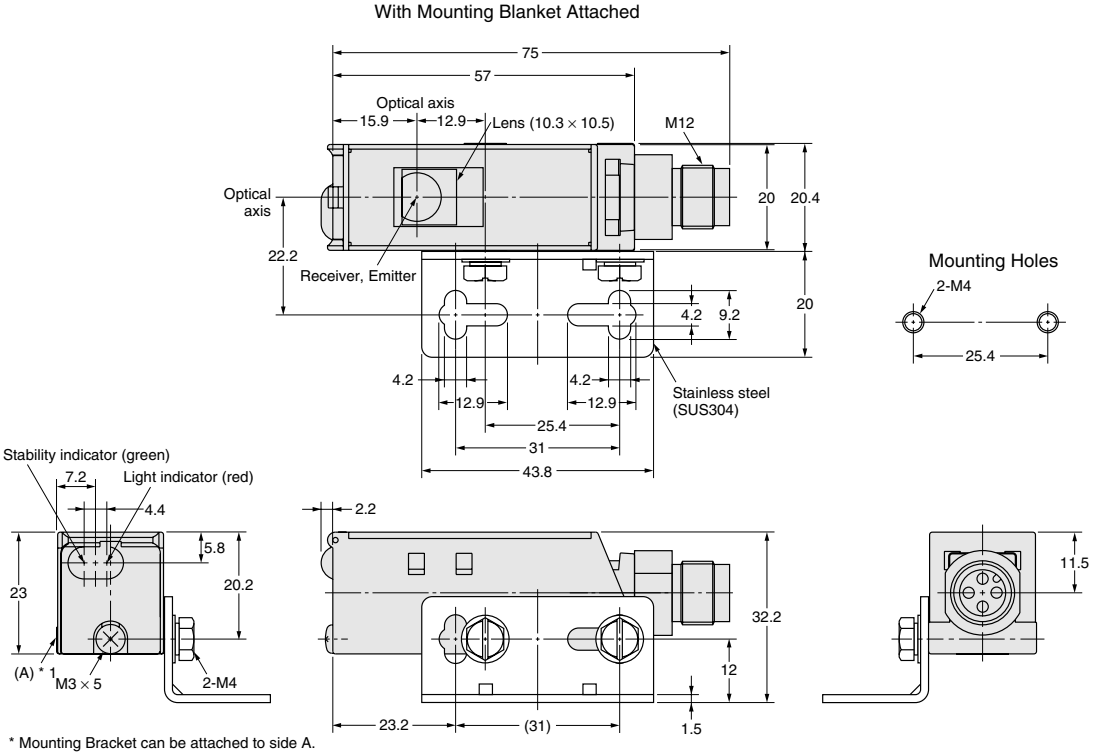


* Mounting Bracket can be attached to side A.

Connector type

E3S-CR67-C

With Mounting Blanket Attached



* Mounting Bracket can be attached to side A.

Accessories (Order Separately)

H-3

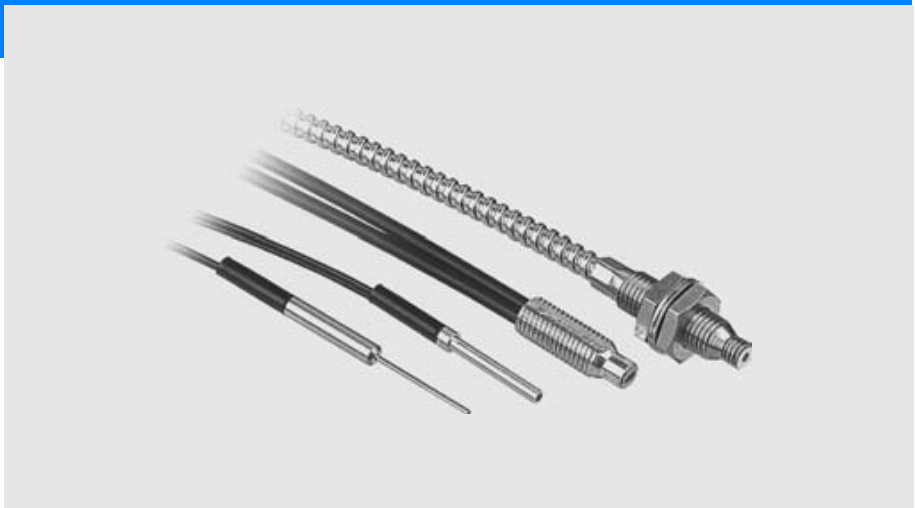
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E268-E2-01-X

Standard fiber unit

E32

The fiber optic - E32 series provides for each sensing problem the optimum solution



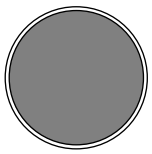
Omron offers with the E32-fiber optics series a huge range of fiber optic sensors for all automation tasks, whether it's for basic object detection, positioning, color analysis or high accuracy sensing.
Omrons takes a leading part in fiber technology with a long time experience in producing
fiber optic solutions for all kind of industry.

Everything from head size, sensing distance, mounting, beam size up to special heat - and chemical resistant materials can be chosen in order to best suit your application.
The E32 series provides for each sensing problem the optimum solution
On top of it, Omron provide customised fiber solutions based on your demand and specification, made in Germany.

Variation of fiber optics

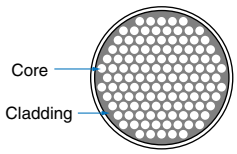
Flexible fiber models are indicated by an "R" at the end of the model number.

Flexible fiber contains multiple cores. These cores are all surrounded by cladding, giving a minimum bending radius of 1 mm. The fiber can be bent at right angles without affecting the light intensity. Handle it just like any other cable.



Conventional Fiber

Conventional fiber uses just one core and one cladding section. Bending the fiber may break it or reduce the light intensity.



Flexible Fiber

Flexible fiber contains multiple independent cores all surrounded by cladding. The fiber can be bent without breaking or reducing the light intensity.

Fiber for robot application

Individual cores in one bundle, Surrounded by cladding, Strong against repeatable bending.
Bending radius 4 mm

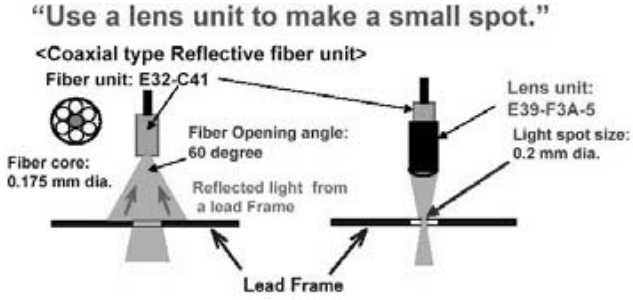
Coaxial fibers

The accuracy of coaxial fibers is very high, due to the special orientation of transmitter- and receiver fibers.
With the special lens unit, the spot beam can be reduced to min. 0,1 mm.

E32-EC31

E32-EC41

Coaxial fibers and lens unit (small spot)



Beam Spot variable type E39-F3A

Beam spot can be changed from 0.1 to 1 mm dia., applicable to various size of sensing objects.

Applicable fiber unit:

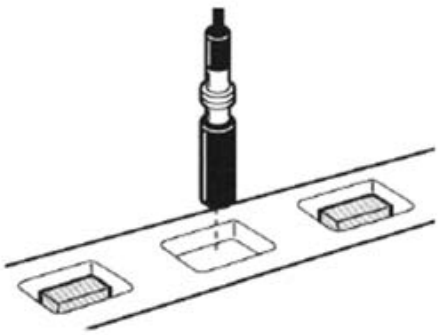
Beam spot 0.5 to 1 mm: E32-D32

Beam spot 0.1 to 0.6 mm: E32-C42

Long distance & Minute spot E39-F3B

Achieving 0.2 mm dia. spot & 15 mm sensing distance.

Detection of chips on embossed tape.



Applicable fiber unit:

E32-EC31

E32-EC41

Minute beam spot E39-F3A-5

Achieving 0.1 mm dia. spot & 7 mm sensing distance. Optimum solution for downsizing of electronic parts.

Detection of front or back of "0603" chips.

Applicable fiber unit:

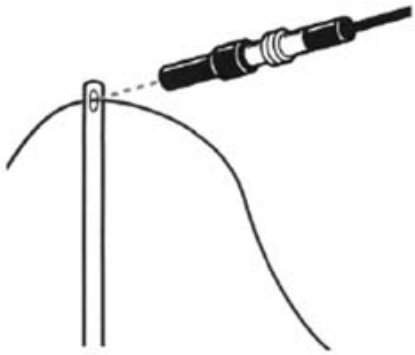
E32-EC31

E32-EC41

Long distance type E39-F3C

Achieving 0.2 mm dia. spot & 20 mm sensing distance.

Detection of yarn for industrial sewing machine.

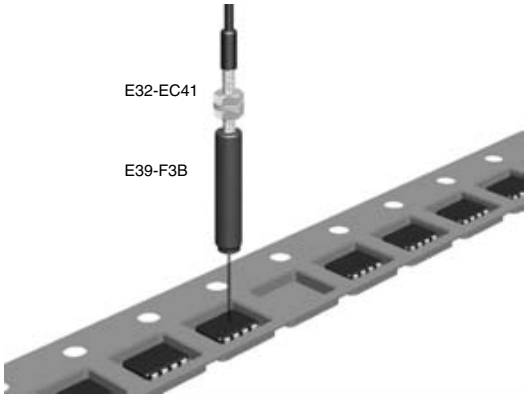


Applicable fiber unit:

E32-EC31

E32-EC41

Detection missing chips on embossed tape. Adding a lens unit to a fiber sensor permits the detection of very small workpieces at a detection distance of 17 mm with a 0.2 mm diameter spot.



E32-EC41 Fiber Unit

E39-F3B Lens Unit.

Fibers for Robot application (Strong against repeatable bending)

Omron offers special fibers with independent cores in one bundle.

This fibers are very strong against repeatable bending and suitable for moving- and robot applications.

Moving-piece-mounting Fiber Unit E32-D11/D21

Detecting workpiece by robot hand

An allowable bending radius of 4 mm enables the E32-D11/D21 to withstand repeated bending, making it ideal applicable to moving parts subject to frequent bending

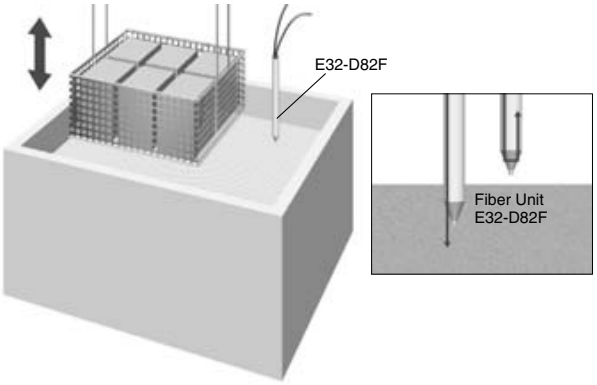
Liquid level detection

Direct contact type E32-D82F

The E32-D82F1 / E32-D82F2 are suitable for high accuracy detection of fluid level detection in tanks. The principle is based on the change of the refractive index when the sensor touches the medium. The fiber head is PTFE covered and therefore chemical resist and can be used for high temperature up to 200°C.

Level detection in heated chemicals

The fiber unit uses PTFE so that chemical levels can be precisely and directly detected in cleaning tanks or chemical processing tanks.

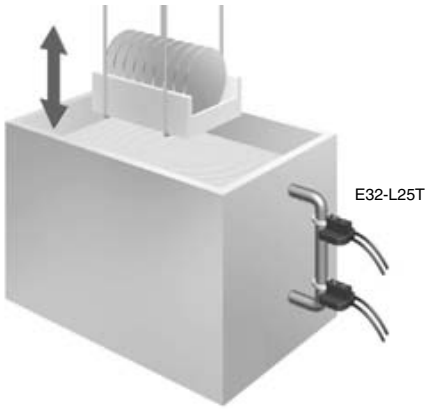


Tube mounting E32-L25T

Omron offers a variation of different level detection sensors. Depending on the mounting situation the applicable tube can be from 3,2 to 10mm dia. For special purpose the fiber material is PTFE covered and therefore chemical resist.

Chemical level detection with pipe mounting

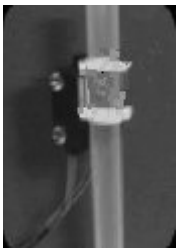
A minimum level difference of 4 mm can be detected in stages to control resist liquid levels.

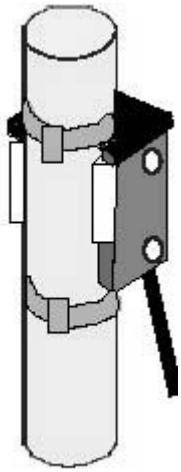


E32-D36F

The wide sensing area provide a stable liquid detection without influence of bubbles.

Due to the special sensing head there is no limitation to tube diameter, (thickness of tube max. 1,6 mm, bending radius 4 mm).

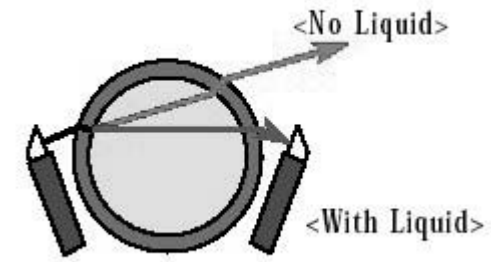




Product Features:

- Omron original optical design using prism to provide a great signal noise ratio. The wide area sensing method (11mm) is nearly not influenced by bubbles or water drops in a tube.
- E32-A1 has a fail-safe function output an faulty signal, which is the same as " No Liquid" signal when the fiber unit is accidentally broken or released from the fiber amplifier unit.
- Dark red resist liquid can stably be detected by a high power amplifier unit of E3X-DA-N which has an LED auto power control circuit.
- Fluorine resin coated, bundle type fiber cable (bending radius: 4 mm) can be cut freely.

Sensing Principle:

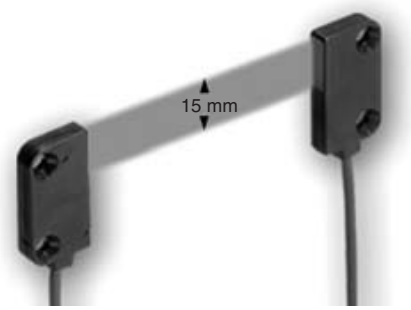


Area Type

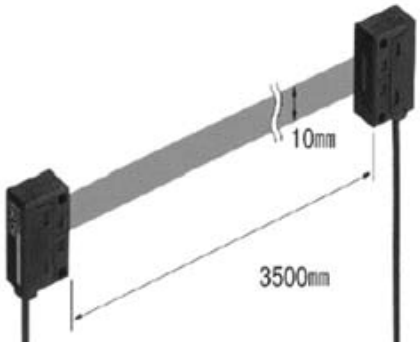
Omron offers a variation of area sensing fibers from 10 mm area up to 30 mm area. Due to the area the sensor can easily detect parts somewhere on a conveyer even when the parts are not very good guided.

Standard screen E32-T16P/-T16

E32-T16P standard screen fiber sensor, providing 11 mm width of area detection.



E32-T16 long distance screen sensor, providing 11 mm width & 3,500 mm max. distance of area detection.

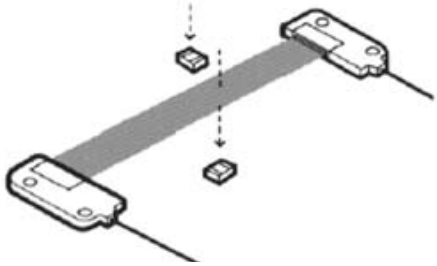


Wide Screen E32-T16WR

Widest screen in the industry

By the 30 mm wide optical screen, provide wide area detection.

Applicable to parts feeder for various size of parts.

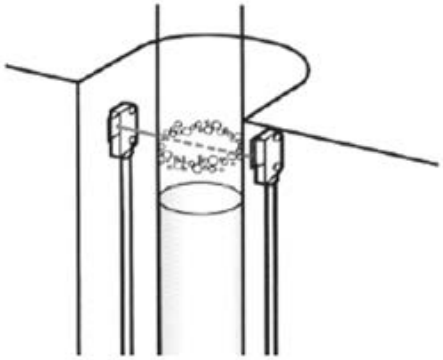


Side-view E32-T16J

First in the industry

By the adoption of prism, achieved side-view screen reflective sensor. Optimum for mounting to limited space.

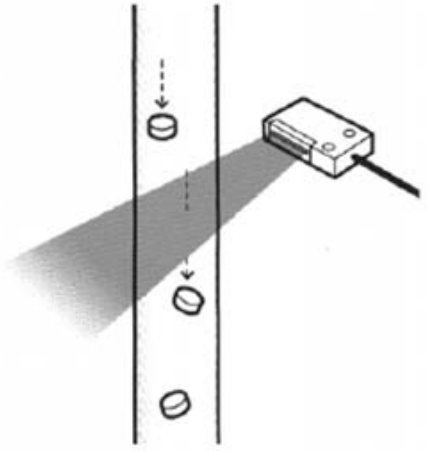
Detection of liquid level throug transparent tube.



Screen reflective E32-D36P1

Screen reflective sensor provide wide area detection and space saving mounting.

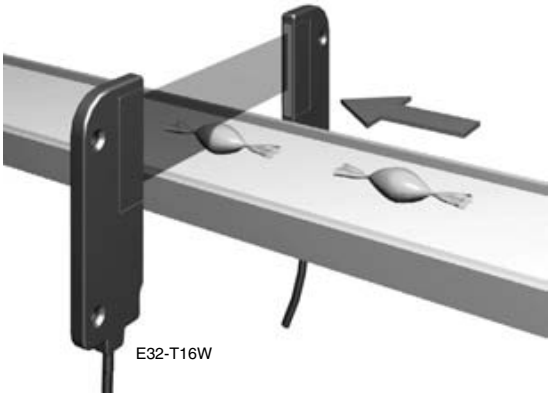
Detection of pills through transparent tube.



Area detecting fiber unit E32-T16W

Detecting the front edge location of candies

Area detection using a screen fiber enables positioning of even irregularly shaped objects.



Area detecting fiber unit E32-T16P

Inspection of tape remaining in tape take-up application

Chemical resistant

Due to the PTFE covered sensor head and fiber, the sensor is resist against oil and chemicals. Also the combination of chemical- and temperature resistant for 200 °C is available.

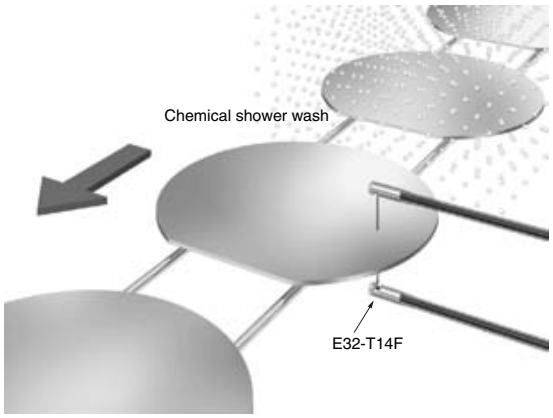
Overview of chemical and temperature resistant fibers:

Temperature	Through Beam Type	Reflection Type
-40 °C to 200 °C	E32-T81F-S	
-30 °C to 70 °C	E32-T11F E32-T12F E32-T14F	E32-D12F

PTFE side-view fiber unit E32-T14F

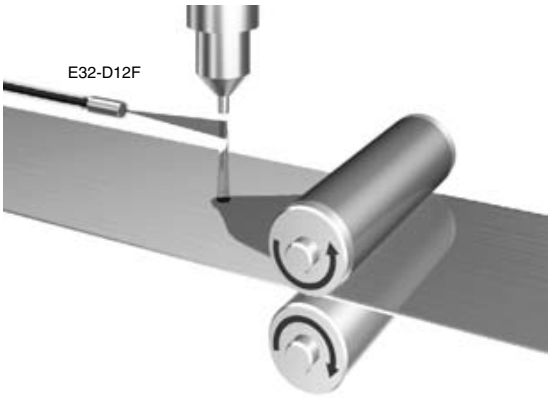
Detection on narrow lines for chemical washing

PTFE side view fiber units are ideal for applications requiring resistance to chemicals when the sensor can be installed on a narrow line.



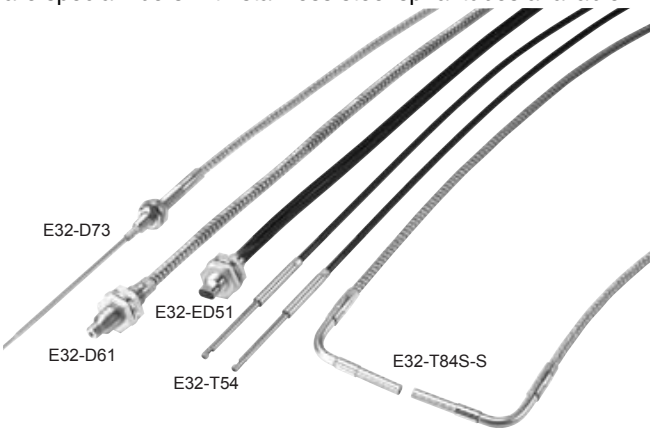
Chemical-resistant fiber unit E32-D12F

The E32-D12F can detect light reflected from oil drops. The PTFE fiber can also be safely used in an environment where oil is likely to be spattered.



Heat resistant fibers

Omron offers a huge variation of heat resistant fibers, beginning from 150 °C, PTFE covered and for extreme temperature resist up to 400 °C. For strong mechanical strength there are special fibers with stainless steel spiral tubes available.



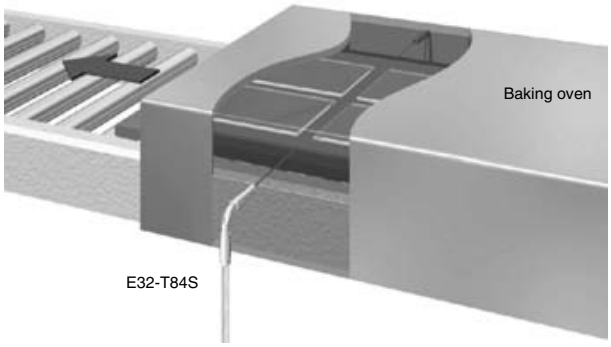
Overview of heat resistant fibers:

Temperature	Trough Beam Type	Reflection Type
150 °C	E32-T54	E32-ED51
	E32-ET51	
200 °C	E32-T84S-S	E32-D81R-S
	E32-T81R-S	E32-D81R
300 °C		E32-D61
350 °C	E32-T61-S	E32-D61-S
400 °C		E32-D73
		E32-D73-S

Heat-resistant, narrow beam fiber unit E32-T84S

Detecting glass substrates in baking ovens

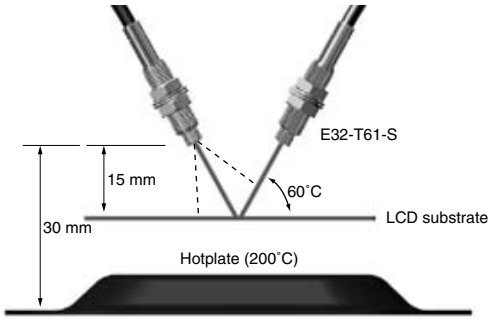
An L-shaped side-view sensor requiring little space and providing 200 °C heat resistance is used. The detection distance of 1,300 mm (for E3X-DA-N standard mode) is more then sufficient to detect even large glass substrates.



Heat-resistant fiber unit E32-T61-S

Detecting liquid crystal substrates in ovens

Regular reflective light from the LCD substrates is received with a fiber to detect the presence or absence of the substrates. The large spot ensures stable detection of substrates even if positioning is not completely consistent.



Limited reflective

Minute difference of displacement E32-L25L

Sensing distance: 7.2 ± 1.8 mm

Minute difference of displacement E32-L25/-L25A

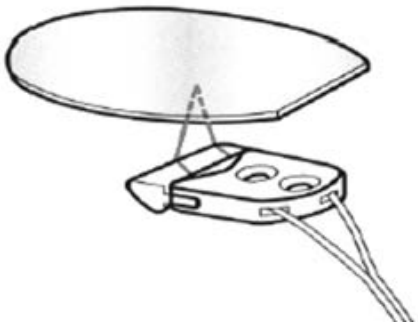
Sensing distance: 3.3 mm

Minute difference & Side-view E32-L24L

With special optical lens

Sensing distance: 4 ± 2 mm

Detection of wafer



E32-L24S

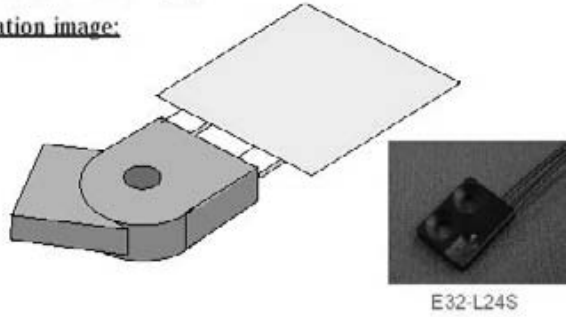
Special optical design provides stable sensing

Sensing distance 0-4 mm

Convergent reflective fiber with a thin and compact housing.

Stable sensing even inclined glass

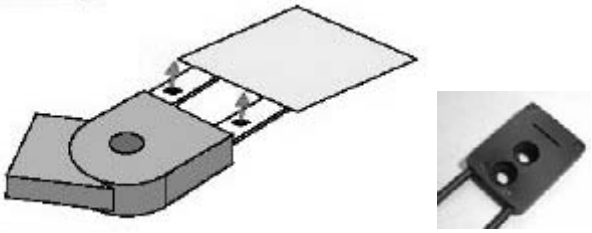
Application image:



E32-L24S

LCD edge positioning sensor E32-L16

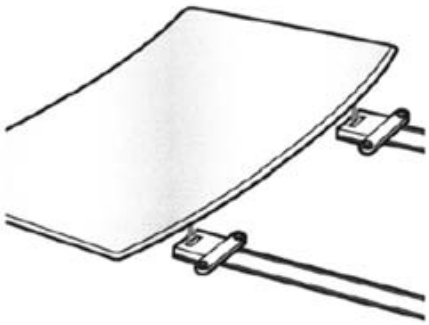
- E32L-16 can make super accurate positioning for an LCD glass sheet on a roboter hand
- E32-L16 can stably detect the inclined surface of LCD
- Ultra thin and small body can fit into robot hand.



Heat-resistive & precise positioning

For precise positioning at the sensing range of 4 mm to 12 mm under high temperature environment.

Positioning of LCD (E32-L56E1/-L56E2)



Mapping sensors

With the narrow beam fibers of E32-A03 and E32-A04 Omron offers very successful fiber mapping sensors, with an opening angle of 1,5 for E32-A03 to 3 ° for E32-A04.

Depending on the amplifier mode the sensing distance can be set up from 500 to 1.100 mm.

Mapping fiber units E32-A03/-A04

Mapping wafers with a through-beam side-view sensor

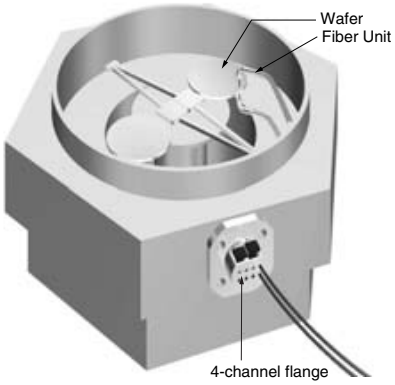
The narrow beam permits the detection of single wafers, even of wafers with mirror surfaces.

Vacuum resist sensors

Vacuum sensors E32-V

Detecting wafers in a vacuum conveyance system

The E32-V provides an easy-connecting fiber and easy-to-use 4-channel flange system, making it ideally applicable to vacuum systems.

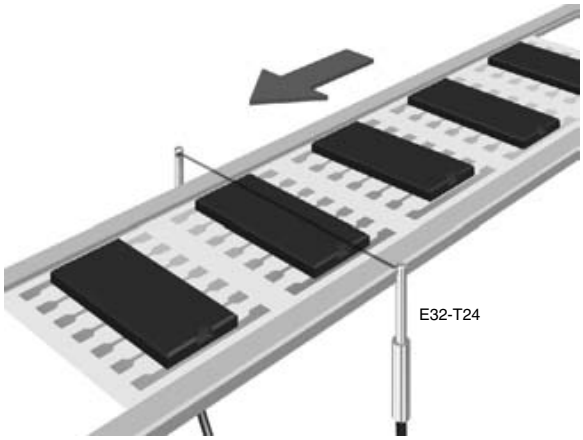


Side-view sensors

Thin side-view fiber unit E32-T24

Detecting rises in lead frames

Easy detection even in tight spaces, is possible with no sleeve bending.

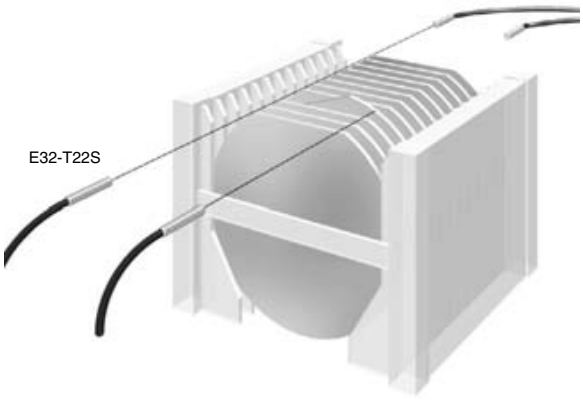


High precision

Narrow-view fiber unit E32-T22S

Checking orientation flat directions with a fiber unit

High-precision detection is possible using a narrow-view beam.

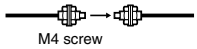


Sensing Distance

General purpose

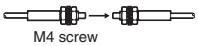
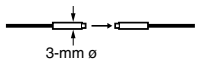
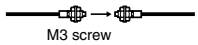
Throughbeam fiber units

High resolution mode
Super long-distance mode
Green light
Red light
Standard mode
Super high-speed mode
Infrared ray

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm) *1 (Parentheses: With E39-F1 Lens Unit)	Standard object (min. sensing object *2) (Parentheses: Opaque object)	Model	Permissible bending radius
M4 Free-cut		E3X-DA□-S	1,000 (4,000)*3 760 (4,000)*3 200 (1,500)	1.0 mm ø (0.005 mm ø)	E32-TC200	25 mm
		E3X-DAG□-S E3X-DAB□-S	100 (700) 75 (550) 45 (350)			
		E3X-DA□-N	950 (4,000)*3 760 (4,000)*3 280 (2,100)	1 mm ø (0.01 mm ø)		
		E3X-DAB #-N	100 (700) 75 (550) 45 (350)			
		E3X-DAH□-N	250 200 70			
		E3X-MDA	650 (4,000)*3 500 (3,700) 200 (1,500)	1.0 mm ø (0.005 mm ø)		
		E3X-NA□(V)	400 (3,000)	1.0 mm ø (0.03 mm ø)		
		E3X-NAG□	75 (550)			
		E3X-NA□F	120 (900)	1.0 mm ø (0.2 mm ø)		
M4 Free-cut		E3X-DA□-S	700 (4,000)*3 530 (3,700) 140 (970)	1.0 mm ø (0.005 mm ø)	E32-ET11R	1 mm
		E3X-DA□-N	670 (4,000) 530 (3,700)*3 200 (1,400)	1.0 mm ø (0.03 mm ø)		
		E3X-MDA	450 (3,100) 350 (2,400) 140 (970)	1.0 mm ø (0.005 mm ø)		
		E3X-NA□(V)	280 (2,100)	1.0 mm ø (0.03 mm ø)		
		E3X-NAG□	50 (375)			
		E3X-NA□F	80	1.0 mm ø (0.2 mm ø)		

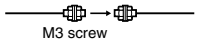
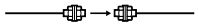
*1. Sensing distance based on white paper.
*2. Indicates values for standard mode.
*3. Longer sensing distance by using the lens unit E39-F1.

High resolution mode / Standard mode
Super long-distance mode / Super high-speed mode
Green light / Red light / Infrared ray

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm) *1 (Parentheses: With E39-F1 Lens Unit)	Standard object (min. sensing object *2) (Parentheses: Opaque object)	Model	Permissible bending radius
M4 Fiber sheat material: fluorine resin Free-cut	 M4 screw	E3X-DA□-S	900 (4,000)*2 680 (3,600) 180 (930)	1.0 mm ø (0.005 mm ø)	E32-T11U NEW	4 mm
		E3X-DA#-N	850 (4,000)*3 680 (3,800)*3 250 (1,300)	1.0 mm ø (0.01 mm ø)		
		E3X-MDA	580 (3,000)*3 450 (2,300) 180 (930)	1.0 mm ø (0.005 mm ø)		
		E3X--NA#(V)	360	1.0 mm ø (0.003 mm ø)		
		E3X--NA#F	100	1.0 mm ø (0.02 mm ø)		
3 mm ø Free-cut	 3-mm ø	E3X-DA□-S	700 530 140	1.0 mm ø (0.005 mm ø)	E32-T12R	1 mm
		E3X-DA□-N	670*3 530 200	1 mm ø (0.01 mm ø)		
		E3X-MDA	450 350 140	1.0 mm ø (0.005 mm ø)		
		E3X-NA□(V)	280	1.0 mm ø (0.03 mm ø)		
		E3X-NAG□	50			
		E3X-NA□F	80	1.0 mm ø (0.2 mm ø)		
M3 Possible to mount the E39-F5 reflective side-view conversion attachment Free-cut	 M3 screw	E3X-DA□-S	900 680 180	1.0 mm ø (0.005 mm ø)	E32-TC200A	25 mm
		E3X-DA□-N	850 680 250	1 mm ø (0.01 mm ø)		
		E3X-MDA	580 450 180	1.0 mm ø (0.005 mm ø)		
		E3X-NA□(V)	360	1.0 mm ø (0.03 mm ø)		
		E3X-NAG□	65			
		E3X-NA□F	100	1.0 mm ø (0.2 mm ø)		

*1. Sensing distance based on white paper.
*2. Indicates values for standard mode.
*3. Longer sensing distance by using the lens unit E39-F1.

High resolution mode　Standard mode
Super long-distance mode　Super high-speed mode
Green light　Red light　Infrared ray

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm) *1 (Parentheses: With E39-F1 Lens Unit)	Standard object (min. sensing object *2) (Parentheses: Opaque object)	Model	Permissible bending radius
M3 For detecting minute sensing objects Free-cut		E3X-DA□-S	270 220 50	0.5 mm ø (0.005 mm ø)	E32-TC200E	10 mm
		E3X-DAG□-S E3X-DAB□-S	25 20 12			
		E3X-DA□-N	250 220 90	0.5 mm ø (0.01 mm ø)		
		E3X-DAB#-N	25 20 12			
		E3X-MDA	170 130 50	0.5 mm ø (0.005 mm ø)		
		E3X-NA□(V)	100	0.5 mm ø (0.03 mm ø)		
		E3X-NAG□	20			
		E3X-NA□F	30	0.5 mm ø (0.1 mm ø)		
M3 Free-cut		E3X-DA□-S	160 130 30	0.5 mm ø (0.005 mm ø)	E32-ET21R	1 mm
		E3X-DA□-N	150 130 50	0.5 mm ø (0.005 mm ø)		
		E3X-MDA	100 75 45	0.5 mm ø (0.01 mm ø)		
		E3X-NA□(V)	60	0.5 mm ø (0.03 mm ø)		
		E3X-NAG□	12			
		E3X-NA□F	18	0.5 mm ø (0.1 mm ø)		

*1. Sensing distance based on white paper.
*2. Indicates values for standard mode.
*3. Longer sensing distance by using the lens unit E39-F1.

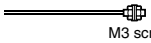
Diffuse reflective fibre units

High resolution mode / Standard mode
Super long-distance mode / Super high-speed mode
Green light / Red light / Infrared ray

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1	Standard object (min. sensing object *2) (Parentheses: Opaque object)	Model	Permissible bending radius
M6 Free-cut		E3X-DA□-S	500 300 90	400x400 (0.005 mm ø)	E32-DC200	25 mm
		E3X-DAG□-S E3X-DAB□-S	32 25 16	100x100 (0.1 mm ø)		
		E3X-DA□-N	400 300 100	400x400 (0.01 mm ø)		
		E3X-DAB#-N	32 25 16	100x100 (0.1 mm ø)		
		E3X-DAH□-N	100 75 25	100x100 (0.01 mm ø)		
		E3X-MDA	300 210 90	400x400 (0.005 mm ø)		
		E3X-NA□(V)	150	200x200 (0.01 mm ø)		
		E3X-NAG□	25	50x50 (0.1 mm ø)		
		E3X-NA□F	50	75x75 (0.015 mm ø)		
M6 Free-cut		E3X-DA□-S	300 170 50	300x300 (0.005 mm ø)	E32-D11R	1 mm
		E3X-DA□-N	220 170 80	300x300 (0.01 mm ø)		
		E3X-MDA	300 170 50	300x300 (0.005 mm ø)		
		E3X-NA□(V)	90	150x150 (0.01 mm ø)		
		E3X-NAG□	15	25x25 (0.1 mm ø)		
		E3X-NA□F	30	50x50 (0.02 mm ø)		

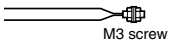
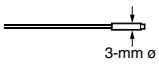
*1. Sensing distance based on white paper.
*2. Indicates values for standard mode.

High resolution mode / Standard mode
Super long-distance mode / Super high-speed mode
Green light / Red light / Infrared ray

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1	Standard object (min. sensing object *2) (Parentheses: Opaque object)	Model	Permissible bending radius
M6 Fiber sheat material: fluorine resin Free-cut	 M6 screw	E3X-DA□-S	300 170 50	300x300 (0.005 mm ø)	E32-D11U NEW	4 mm
		E3X-DA#-N	220 170 80	300x300 (0.01 mm ø)		
		E3X-MDA	170 120 50	300x300 (0.005 mm ø)		
		E3X--NA#(V)	90	150x150 (0.01 mm ø)		
		E3X--NA#F	30	50x50 (0.0015 mm ø)		
3 mm ø Free-cut	 3-mm ø	E3X-DA□-S	300 170 50	300x300 (0.005 mm ø)	E32-D12R	1 mm
		E3X-DA□-N	220 170 80	300x300 (0.01 mm ø)		
		E3X-MDA	170 120 50	300x300 (0.005 mm ø)		
		E3X-NA□(V)	90	150x150 (0.01 mm ø)		
		E3X-NAG□	15	25x25 (0.1 mm ø)		
		E3X-NA□F	30	50x50 (0.02 mm ø)		
M3 Free-cut	 M3 screw	E3X-DA□-S	130 80 22	100x100 (0.005 mm ø)	E32-DC200E	10 mm
		E3X-DAG□-S E3X-DAB□-S	32 25 16	25x25 (0.2 mm ø)		
		E3X-DA□-N	100 80 30	100x100 (0.01 mm ø)		
		E3X-DAB#-N	8 6 4	25x25 (0.2 mm ø)		
		E3X-MDA	80 55 22	100x100 (0.005 mm ø)		
		E3X-NA□(V)	36	50x50 (0.01 mm ø)		
		E3X-NAG□	6	25x25 (0.1 mm ø)		
		E3X-NA□F	12	25x25 (0.02 mm ø)		

*1. Sensing distance based on white paper.
*2. Indicates values for standard mode.

High resolution mode | Standard mode
Super long-distance mode | Super high-speed mode
Green light | Red light | Infrared ray

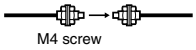
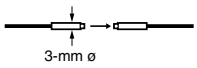
Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1	Standard object (min. sensing object *2) (Parentheses: Opaque object)	Model	Permissible bending radius
M3 (small ø) Free-cut		E3X-DA□-S	□50 ▒30 ▯8	50x50 (0.005 mm ø)	E32-ED21R	1 mm
		E3X-DA□-N	■40 ▒30 ▯10	50x50 (0.01 mm ø)		
		E3X-MDA	□30 ▯22 ▯8	50x50 (0.005 mm ø)		
		E3X-DA□-N	■40 ▒30 ▯10	50x50 (0.01 mm ø)		
		E3X-NA□(V)	▯15	25x25 (0.01 mm ø)		
		E3X-NA□F	▯5	25x25 (0.03 mm ø)		
3 mm ø (small ø) Free-cut		E3X-DA□-S	□50 ▒30 ▯8	50x50 (0.005 mm ø)	E32-D22R	1 mm
		E3X-DA□-N	■40 ▒30 ▯10	50x50 (0.01 mm ø)		
		E3X-MDA	□30 ▯22 ▯8	50x50 (0.005 mm ø)		
		E3X-NA□(V)	▯15	25x25 (0.01 mm ø)		
		E3X-NA□F	▯5	25x25 (0.03 mm ø)		

*1. Sensing distance based on white paper.
*2. Indicates values for standard mode.

Long-distance

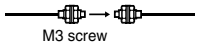
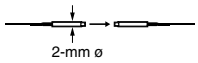
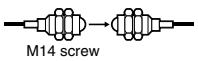
Throughbeam fiber units

High resolution mode
Super long-distance mode
Green light
Red light
Standard mode
Super high-speed mode
Infrared ray

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm) *1 (Parentheses: With E39-F1 Lens Unit)	Standard object (min. sensing object *2) (Parentheses:	Model	Permissible bending radius
M4 Free-cut		E3X-DA□-S	1,700 (4,000)*3 1,330 (3,200) 350 (840)	1.4 mm ø (0.01 mm ø)	E32-T11L	25 mm
		E3X-DAG□-S E3X-DAB□-S	150 120 75			
		E3X-DA□-N	1,660 (4,000) 1,330 (3,200) 490 (1,200)	1.4 mm ø (0.02 mm ø)		
		E3X-DAB#-N	150 120 75			
		E3X-DAH□-N	430 350 120			
		E3X-MDA	1,100 (2,600)*3 870 (2,000) 350 (840)	1.4 mm ø (0.01 mm ø)		
		E3X-NA□(V)	700 (2,000)	1.4 mm ø (0.03 mm ø)		
		E3X-NAG□	130 (370)			
		E3X-NA□F	210 (600)	1.4 mm ø (0.5 mm ø)		
3-mm ø Free-cut		E3X-DA□-S	1,700 1,330 350	1.4-mm ø (0.01-mm ø)	E32-T12L	
		E3X-DA□-N	1,660 1,330 490			
		E3X-MDA	1,100 870 350			
		E3X-NA□(V)	700	1.4 mm ø (0.03 mm ø)		
		E3X-NAG□	130			
		E3X-NA□F	210	1.4 mm ø (0.5 mm ø)		

*1. Sensing distance based on white paper.
*2. Indicates values for standard mode.
*3. Longer sensing distance by using the lens unit E39-F

High resolution mode | Standard mode
Super long-distance mode | Super high-speed mode
Green light | Red light | Infrared ray

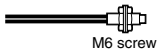
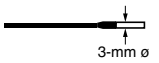
Features	Shape	Applicable Amplifier Unit	Sensing distance (mm) *1 (Parentheses: With E39-F1 Lens Unit)	Standard object (min. sensing object *2) (Parentheses:	Model	Permissible bending radius
M3 Free-cut	 M3 screw	E3X-DA□-S	540 440 100	0.9 mm ø (0.005 mm ø)	E32-T21L	10 mm
		E3X-DA□-N	500 440 180	0.9 mm ø (0.01 mm ø)		
		E3X-MDA	340 260 100	0.9-mm ø (0.005-mm ø)		
		E3X-NA□(V)	200	0.9 mm ø (0.03 mm ø)		
		E3X-NAG□	40			
		E3X-NA□F	60	0.9 mm ø (0.2 mm ø)		
2-mm ø; small ø Free-cut	 2-mm ø	E3X-DA□-S	540 440 100	0.9-mm ø (0.005-mm ø)	E32-T22L	
		E3X-DA□-N	500 440 180	0.9 mm ø (0.01 mm ø)		
		E3X-MDA	340 260 100	0.9 mm ø (0.005 mm ø)		
		E3X-NA□(V)	200	0.9 mm ø (0.03 mm ø)		
		E3X-NAG□	40			
		E3X-NA□F	60	0.9 mm ø (0.2 mm ø)		
M14; with lens; ideal for explosion-proof applications Free-cut	 M14 screw	E3X-DA□-S	20,000*5 20,000*5 4,000*5	10 mm ø	E32-T17L	25 mm
		E3X-DA□-N	20,000*3 20,000 9,800	10 mm ø (0.01 mm ø)		
		E3X-MDA	13,000 10,000 4,000	10-mm ø		
		E3X-NA□(V)	14,000	10 mm ø (0.1 mm ø)		
		E3X-NA□F	4,200	10 mm ø (1.5 mm ø)		

*1. Sensing distance based on white paper.
*2. Indicates values for standard mode.
*3. Longer sensing distance by using the lens unit E39-F

Long distance

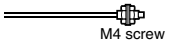
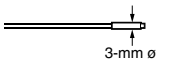
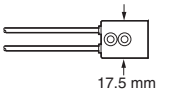
Diffuse reflective fiber units

High resolution mode
Super long-distance mode
Green light
Red light
Standard mode
Super high-speed mode
Infrared ray

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm) *1	Standard object *2 (min. sensing object: Gold wire)	Model	Permissible bending radius
M6 Free-cut		E3X-DA□-S	650 400 110	500x500 (0.005 mm ø)	E32-D11L	25 mm
		E3X-DAG□-S E3X-DAB□-S	44 35 22	100x100 (0.1 mm ø)		
		E3X-DA□-N	500 400 150	500x500 (0.01 mm ø)		
		E3X-DAB#-N	44 35 22	100x100 (0.1 mm ø)		
		E3X-DAH□-N	130 100 30	200x200 (0.01 mm ø)		
		E3X-MDA	400 270 110	500x500 (0.005 mm ø)		
		E3X-NA□(V)	200	250x250 (0.01 mm ø)		
		E3X-NAG□	35	50x50 (0.1 mm ø)		
		E3X-NA□F	65	100x100 (0.015 mm ø)		
3 mm ø; small ø Free-cut		E3X-DA□-S	400 230 70	300x300 (0.005 mm ø)	E32-D12	
		E3X-DA□-N	300 230 100	300x300 (0.01 mm ø)		
		E3X-MDA	230 160 70	300x300 (0.005 mm ø)		
		E3X-NA□(V)	120	150x150 (0.01 mm ø)		
		E3X-NAG□	20	25x25 (0.1 mm ø)		
		E3X-NA□F	40	50x50 (0.015 mm ø)		

*1. Sensing distance based on white paper.
*2. Indicates values for standard mode.

High resolution mode | Standard mode
Super long-distance mode | Super high-speed mode
Green light | Red light | Infrared ray

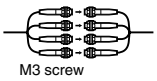
Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1	Standard object *2 (min. sensing object: Gold wire)	Model	Permissible bending radius
M4 Free-cut		E3X-DA□-S	210 130 35	200x200 (0.005 mm ø)	E32-D21L	10 mm
		E3X-DA□-N	160 130 45	200x200 (0.01 mm ø)		
		E3X-MDA	130 85 35	200x200 (0.005 mm ø)		
		E3X-NA□(V)	50	100x100 (0.01 mm ø)		
		E3X-NAG□	10	25x25 (0.1 mm ø)		
		E3X-NA□F	17	25x25 (0.015 mm ø)		
3 mm ø; small ø Free-cut		E3X-DA□-S	210 130 35	200x200 (0.005 mm ø)	E32-D22L	10 mm
		E3X-DA□-N	160 130 45			
		E3X-MDA	130 85 35			
		E3X-NA□(V)	50	100x100 (0.01 mm ø)		
		E3X-NAG□	10	25x25 (0.1 mm ø)		
		E3X-NA□F	17	25x25 (0.015 mm ø)		
Square head, super-long distance Free-cut		E3X-DA□-S	40 to 1,000 40 to 700 40 to 240	300x300	E32-D16 NEW	4 mm
		E3X-MDA	40 to 600 40 to 490 40 to 240			
		E3X-DA#-N	40~1,000 40~700 40~400			
		E3X--NA#(V)	40~400			
		E3X--NA#F	55~70			

*1. Sensing distance based on white paper.
*2. Indicates values for standard mode.

Area sensing

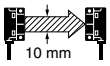
Throughbeam fiber units

High resolution mode
Super long-distance mode
Green light
Standard mode
Super high-speed mode
Red light

Features	Appearance	Applicable Amplifier Unit	Sensing distance (mm) *1 (Parentheses: With E39-F1 Lens Unit)	Standard object *2 (min. sensing object) (Parentheses: Opaque object)	Model	Permissible bending radius
Multi-point detection (4-head)		E3X-DA□-S	750 610 140	2 mm ø (0.1 mm ø)	E32-M21	25 mm
		E3X-DA□-N	700 610 250	2.0 mm ø (0.01 mm ø)		
		E3X-MDA	470 360 140	2 mm ø (0.1 mm ø)		
		E3X-NA□(V)	300	2.0 mm ø (0.03 mm ø)		
		E3X-NA□F	90	2.0 mm ø (0.3 mm ø)		
Detects in a 30 mm area Free-cut		E3X-DA□-S	2,300 1,800 450	(0.3 mm ø) *4	E32-T16W	10 mm
		E3X-DA□-N	2,300 1,800 660			
		E3X-MDA	1,400 1,100 450			
		E3X-NA□(V)	920	(0.5 mm ø) *3		
		E3X-NAG□	170			
		E3X-NA□F	270	(4.0 mm ø) *3		
		E3X-DA□-S	1,700 1,300 340	(0.3 mm ø) *4	E32-T16WR	1 mm
		E3X-DA□-N	1,700 1,300 500			
		E3X-MDA	1,100 860 340			
		E3X-NA□(V)	690	(0.5 mm ø) *3		
		E3X-NA□F	200	(4.0 mm ø) *3		

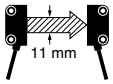
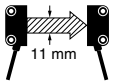
*1. Sensing distance based on white paper.
*2. Indicates values for standard mode.
*3. The sensing distance is 100 mm, possible detection within specified area under static condition
*4. The sensing distance is 300 mm, possible detection within specified area under static condition.

High resolution mode
Super long-distance mode
Green light
Standard mode
Super high-speed mode
Red light

Features	Appearance	Applicable Amplifier Unit	Sensing distance (mm) *1 (Parentheses: With E39-F1 Lens Unit)	Standard object *2 (min. sensing object) (Parentheses: Opaque object)	Model	Permissible bending radius
Side-view suitable for applications with limited spatial depth Free-cut		E3X-DA□-S	1,300 1,000 260	(0.2 mm ø)*4	E32-T16J	10 mm
		E3X-DA□-N	1,300 1,000 280			
		E3X-MDA	800 650 260			
		E3X-NA□(V)	520	(0.3 mm ø)*3		
		E3X-NAG□	95			
		E3X-NA□F	150	(2.0 mm ø)*3		
		E3X-DA□-S	980 750 190	(0.2 mm ø)*4	E32-T16JR	1 mm
		E3X-DA□-N	980 750 210			
		E3X-MDA	600 480 190			
		E3X-NA□(V)	390	(0.3 mm ø)*3		
		E3X-NA□F	110	(2.0 mm ø)*3		
Suitable for detecting over a 10 mm area; long distance Free-cut		E3X-DA□-S	3,700 2,800 740	(0.6 mm ø)*5	E32-T16	25 mm
		E3X-DA□-N	3,500 2,800 1,000			
		E3X-MDA	2,400 1,800 740			
		E3X-NA□(V)	1,500	(0.9 mm ø)*3		
		E3X-NAG□	275			
		E3X-NA□F	450	(1.5 mm ø)*3		

*1. Sensing distance based on white paper.
*2. Indicates values for standard mode.
*3. The sensing distance is 100 mm, possible detection within specified area under static condition
*4. The sensing distance is 300 mm, possible detection within specified area under static condition.

High resolution mode
Super long-distance mode
Green light
Standard mode
Super high-speed mode
Red light

Features	Appearance	Applicable Amplifier Unit	Sensing distance (mm) *1 (Parentheses: With E39-F1 Lens Unit)	Standard object *2 (min. sensing object) (Parentheses: Opaque object)	Model	Permissible bending radius
Stable for detecting minute sensing objects in a wide area Free-cut		E3X-DA□-S	1,500 1,100 300	(0.2 mm ø) *4	E32-T16P	10 mm
		E3X-DA□-N	1,400 1,100 420			
		E3X-MDA	970 750 300			
		E3X-NA□(V)	600	(0.3 mm ø) *3		
		E3X-NAG□	110			
		E3X-NA□F	180	(2.0 mm ø) *3		
Stable detection of minute sensing objects, wide sensing area Free-cut		E3X-DA□-S	1,100 840 220	(0.2 mm ø) *4	E32-T16PR	1 mm
		E3X-DA□-N	1,050 840 320			
		E3X-MDA	730 560 220			
		E3X-NA□(V)	450	(0.3 mm ø) *3		
		E3X-NA□F	130	(2.0 mm ø) *3		

*1. Sensing distance based on white paper.
*2. Indicates values for standard mode.
*3. The sensing distance is 100 mm, possible detection within specified area under static condition
*4. The sensing distance is 300 mm, possible detection within specified area under static condition.

Diffuse reflective fiber units

High resolution mode / Standard mode
Super long-distance mode / Super high-speed mode
Green light / Red light

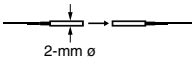
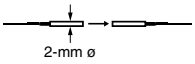
Features	Appearance	Applicable Amplifier Unit	Sensing distance (mm)*1	Standard object*2 (min. sensing object: Gold wire)	Model	Permissible bending radius
Side-view detection over wide areas Free-cut		E3X-DA□-S	250 150 45	300x300 (0.005 mm ø)	E32-D36P1	25 mm
		E3X-DA□-N	200 150 50	300x300 (0.01 mm ø)		
		E3X-MDA	150 100 45	300x300 (0.005 mm ø)		
		E3X-NA□(V)	75	100x100 (0.03 mm ø)		
		E3X-NA□F	25	50x50 (0.03 mm ø)		

*1. Sensing distance based on white paper.
*2. Indicates values for standard mode.

Small fiber head

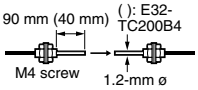
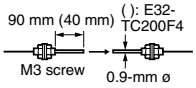
Throughbeam fiber unit

High resolution mode / Standard mode
Super long-distance mode / Super high-speed mode
Green light / Red light

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1 (Parentheses:With E39-F1 Lens Unit)	Standard object*2 (min. sensing object) (Parentheses: Opaque object)	Model	Permissible bending radius
2 mm ø For detecting minute sensing objects Free-cut		E3X-DA□-S	270 220 50	0.5 mm ø (0.005 mm ø)	E32-T22	10 mm
		E3X-DA□-N	250 220 90	0.5 mm ø (0.01 mm ø)		
		E3X-MDA	170 130 50	0.5 mm ø (0.005 mm ø)		
		E3X-NA□(V)	100	0.5 mm ø (0.03 mm ø)		
		E3X-NAG□	20			
		E3X-NA□F	30	0.5 mm ø (0.1 mm ø)		
2 mm ø For detecting minute sensing objects Free-cut		E3X-DA□-S	160 130 30	0.5 mm ø (0.005 mm ø)	E32-T22R	1 mm
		E3X-DA□-N	150 130 50	0.5 mm ø (0.01 mm ø)		
		E3X-MDA	100 75 30	0.5 mm ø (0.005 mm ø)		
		E3X-NA□(V)	60	0.5 mm ø (0.03 mm ø)		
		E3X-NA□F	18	0.5 mm ø (0.1 mm ø)		

*1. Sensing distance based on white paper.
*2. Indicates values for standard mode.

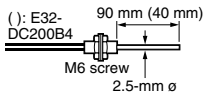
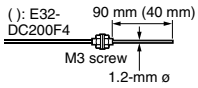
High resolution mode
Super long-distance mode
Green light
Standard mode
Super high-speed mode
Red light

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1 (Parentheses:With E39-F1 Lens Unit)	Standard object*2 (min. sensing object) (Parentheses: Opaque object)	Model	Permissible bending radius
1.2 mm ø with sleeve Free-cut		E3X-DA□-S	1,000 760 200	1.0 mm ø (0.005 mm ø)	E32-TC200B E32-TC200B4	25 mm
		E3X-DAG□-S E3X-DAB□-S	100 75 45			
		E3X-DA□-N	950 760 280	1 mm ø (0.01 mm ø)		
		E3X-DAB#-N	100 75 45			
		E3X-MDA	650 500 200	1.0 mm ø (0.005 mm ø)		
		E3X-NA□(V)	400	1.0 mm ø (0.03 mm ø)		
		E3X-NAG□	75			
		E3X-NA□F	120	1.0 mm ø (0.2 mm ø)		
0.9 mm ø with sleeve Free-cut		E3X-DA□-S	270 220 50	0.5 mm ø (0.005 mm ø)	E32-TC200F E32-TC200F4	10 mm
		E3X-DA□-N	250 220 90	0.5 mm ø (0.01 mm ø)		
		E3X-MDA	170 130 50	0.5 mm ø (0.005 mm ø)		
		E3X-NA□(V)	100	0.5 mm ø (0.03 mm ø)		
		E3X-NAG□	20			
		E3X-NA□F	30	0.5 mm ø (0.1 mm ø)		

*1. Sensing distance based on white paper.
*2. Indicates values for standard mode.

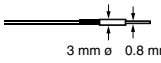
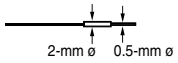
Diffuse reflective fiber units

High resolution mode
Super long-distance mode
Green light
Standard mode
Super high-speed mode
Red light

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1 (Parentheses: With E39-F1 Lens Unit)	Standard object*2 (min. sensing object) (Parentheses: Opaque object)	Model	Permissible bending radius
2.5 mm ø with sleeve Free-cut		E3X-DA□-S	500 300 90	400x400 (0.005 mm ø)	E32-DC200B E32-DC200B4	25 mm
		E3X-DAG□-S E3X-DAB□-S	32 25 16	100x100 (0.1 mm ø)		
		E3X-DA□-N	400 300 100	400x400 (0.01 mm ø)		
		E3X-DAB#-N	32 25 16	100x100 (0.1 mm ø)		
		E3X-MDA	300 210 90	400x400 (0.005 mm ø)		
		E3X-NA□(V)	150	200x200 (0.01 mm ø)		
		E3X-NAG□	25	50x50 (0.1 mm ø)		
		E3X-NA□F	50	75x75 (0.015 mm ø)		
1.2 mm ø with sleeve Free-cut		E3X-DA□-S	130 80 22	100x100 (0.005 mm ø)	E32-DC200F E32-DC200F4	10 mm
		E3X-DA□-N	100 80 30	100x100 (0.01 mm ø)		
		E3X-MDA	80 55 22	100x100 (0.005 mm ø)		
		E3X-NA□(V)	36	50x50 (0.01 mm ø)		
		E3X-NAG□	6	25x25 (0.1 mm ø)		
		E3X-NA□F	12	25x25 (0.02 mm ø)		

*1. Sensing distance based on white paper.
*2. Indicates values for standard mode.

High resolution mode
Super long-distance mode
Green light
Standard mode
Super high-speed mode
Red light

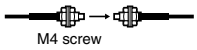
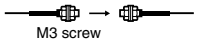
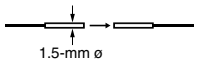
Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1 (Parentheses: With E39-F1 Lens Unit)				Standard object*2 (min. sensing object) (Parentheses: Opaque object)	Model	Permissible bending radius
0.8 mm ø For detecting minute sensing objects Free-cut		E3X-DA□-S	□25 ▮16 ▮4				25x25 (0.005 mm ø)	E32-D33	4 mm
		E3X-DA□-N	■21 ▮16 ▮6				25x25 (0.01 mm ø)		
		E3X-MDA	□16 ▮10 ▮4				25x25 (0.005 mm ø)		
		E3X-NA□(V)	▮10				25x25 (0.01 mm ø)		
		E3X-NA□F	▮3.3				25x25 (0.03 mm ø)		
0.5 mm ø For detecting very minute sensing objects		E3X-DA□-S	▮5 ▮3 ▮0.8				25x25 (0.005 mm ø)	E32-D331	
		E3X-DA□-N	▮4 ▮3 ▮1				25x25 (0.01 mm ø)		
		E3X-MDA	▮3 ▮2 ▮0.8				25x25 (0.005 mm ø)		
		E3X-NA□(V)	▮1.5				25x25 (0.01 mm ø)		
		E3X-NA□F	▮0.5				25x25 (0.05 mm ø)		

*1. Sensing distance based on white paper.
*2. Indicates values for standard mode.

Fiber for Robot Application R4 (Strong against repeatable bending)

Throughbeam fiber unit

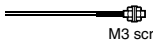
High resolution mode / Super long-distance mode / Green light
Standard mode / Super high-speed mode / Red light

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1 (Parentheses: With E39-F1 Lens Unit)	Standard object*2 (min. sensing object) (Parentheses: Opaque object)	Model	Permissible bending radius
Ideal for mounting on moving sections (R4) Free-cut		E3X-DA□-S	900 (4,000)*3 680 (3,600) 180 (930)	1.0 mm ø (0.005 mm ø)	E32-T11	4 mm
		E3X-DA□-N	850 (4,000)*3 680 (3,600) 250 (1,300)	1.0 mm ø (0.01 mm ø)		
		E3X-MDA	580 (3,000) 450 (2,300) 180 (930)	1.0 mm ø (0.005 mm ø)		
		E3X-NA□(V)	360	1.0 mm ø (0.03 mm ø)		
		E3X-NAG□	65			
		E3X-NA□F	100	1.0 mm ø (0.2 mm ø)		
		E3X-DA□-S	240 200 45	0.5 mm ø (0.005 mm ø)	E32-T21	
		E3X-DA□-N	220 200 80	0.5 mm ø (0.01 mm ø)		
		E3X-MDA	150 110 45	0.5 mm ø (0.005 mm ø)		
		E3X-NA□(V)	100	0.5 mm ø (0.03 mm ø)		
		E3X-NAG□	18			
		E3X-NA□F	30	0.5 mm ø (0.1 mm ø)		
		E3X-DA□-S	240 200 45	0.5 mm ø (0.005 mm ø)	E32-T22B	
		E3X-DA□-N	220 200 80	0.5 mm ø (0.01 mm ø)		
		E3X-MDA	150 110 45	0.5 mm ø (0.005 mm ø)		
		E3X-NA□(V)	100	0.5 mm ø (0.03 mm ø)		
		E3X-NAG□	18			
		E3X-NA□F	30	0.5 mm ø (0.1 mm ø)		

*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.
*3. Sensing distance by using the lens unit E39-F1.

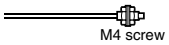
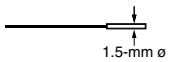
Diffuse reflection fiber units

High resolution mode
Super long-distance mode
Green light
Standard mode
Super high-speed mode
Red light

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1	Standard object*2 (min. sensing object) (Parentheses: Opaque object)	Model	Permissible bending radius
Ideal for mounting on moving sections (R4)	 M6 screw	E3X-DA□-S	300 170 50	300x300 (0.005 mm ø)	E32-D11	4 mm
		E3X-DA□-N	220 170 80	300x300 (0.01 mm ø)		
		E3X-MDA	170 125 50	300x300 (0.005 mm ø)		
		E3X-NA□(V)	90	150x150 (0.01 mm ø)		
		E3X-NAG□	15	25x25 (0.1 mm ø)		
		E3X-NA□F	30	50x50 (0.015 mm ø)		
	 M3 screw	E3X-DA□-S	50 30 8	50x50 (0.005 mm ø)	E32-D21	
		E3X-DA□-N	40 30 10	50x50 (0.01 mm ø)		
		E3X-MDA	30 22 8	50x50 (0.005 mm ø)		
		E3X-NA□(V)	15	25x25 (0.01 mm ø)		
		E3X-NA□F	5	25x25 (0.02 mm ø)		

*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.

High resolution mode
Super long-distance mode
Green light
Standard mode
Super high-speed mode
Red light

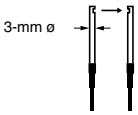
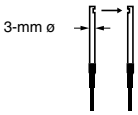
Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1	Standard object*2 (min. sensing object) (Parentheses: Opaque object)	Model	Permissible bending radius
Ideal for mounting on moving sections (R4)	 M4 screw	E3X-DA□-S	110 70 20	100x100 (0.005 mm ø)	E32-D21B	4 mm
		E3X-DA□-N	90 70 25	100x100 (0.01 mm ø)		
		E3X-MDA	70 50 20	100x100 (0.005 mm ø)		
		E3X-NA□(V)	15	25x25 (0.01 mm ø)		
		E3X-NAG□	2.4	25x25 (0.1 mm ø)		
		E3X-NA□F	5	25x25 (0.02 mm ø)		
	 1.5-mm ø	E3X-DA□-S	50 30 8	50x50 (0.005 mm ø)	E32-D22B	
		E3X-DA□-N	40 30 10	50x50 (0.01 mm ø)		
		E3X-MDA	30 22 8	50x50 (0.005 mm ø)		
		E3X-NA□(V)	7	25x25 (0.01 mm ø)		
		E3X-NA□F	2.3	25x25 (0.02 mm ø)		

*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.

Side view

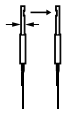
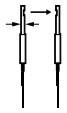
Throughbeam fiber units

High resolution mode
Super long-distance mode
Green light
Standard mode
Super high-speed mode
Red light

Features	Appearance	Applicable Amplifier Unit	Sensing distance (mm)*1 (Parentheses: With E39-F1 Lens Unit)	Standard object (min. sensing object*2) (Parentheses: Opaque object)	Model	Permissible bending radius
Long distance; space-saving Free-cut		E3x-DA□-S	600 460 120	1.0 mm ø (0.005 mm ø)	E32-T14L	25 mm
		E3x-DAG□-S E3x-DAB□-S	50 40 25			
		E3x-DA□-N	570 460 170	1 mm ø (0.01 mm ø)		
		E3x-DAB11-N	50 40 25			
		E3x-DAH□-N	150 120 40			
		E3x-MDA	390 300 120	1.0 mm ø (0.005 mm ø)		
		E3x-NA□(V)	240	1.0 mm ø (0.03 mm ø)		
		E3x-NAG□	45			
		E3x-NA□F	70	1.0 mm ø (0.2 mm ø)		
Space-saving Free-cut		E3x-DA□-S	270 210 50	1.0 mm ø (0.005 mm ø)	E32-T14LR	1 mm
		E3x-DA□-N	270 210 90	1 mm ø (0.01 mm ø)		
		E3x-MDA	170 130 50	1.0 mm ø (0.005 mm ø)		
		E3x-NA□(V)	110	1.0 mm ø (0.03 mm ø)		
		E3x-NA□F	33	1.0 mm ø (0.2 mm ø)		

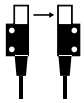
*1. Sensing distance beased on white paper.
*2. Indicates values for standard mode.

High resolution mode　Standard mode
Super long-distance mode　Super high-speed mode
Green light　Red light

Features	Appearance	Applicable Amplifier Unit	Sensing distance (mm)*1 (Parentheses: With E39-F1 Lens Unit)	Standard object (min. sensing object*2) (Parentheses: Opaque object)	Model	Permissible bending radius
Suitable for detecting minute sensing objects; small ø Free-cut	1-mm ø 	E3x-DA□-S	160 130 30	0.5 mm ø (0.005 mm ø)	E32-T24	10 mm
		E3x-DA□-N	150 130 55	0.5 mm ø (0.01 mm ø)		
		E3x-MDA	100 70 30	0.5 mm ø (0.005 mm ø)		
		E3x-NA□(V)	90	0.5 mm ø (0.03 mm ø)		
		E3x-NAG□	12			
		E3x-NA□F	27	0.5 mm ø (0.3 mm ø)		
Suitable for detecting minute sensing objects; small ø Free-cut	1-mm ø 	E3x-DA□-S	60 50 10	0.5 mm ø (0.005 mm ø)	E32-T24R	1 mm
		E3x-DA□-N	60 50 25	0.5 mm ø (0.01 mm ø)		
		E3x-MDA	35 27 10	0.5 mm ø (0.005 mm ø)		
		E3x-NA□(V)	30	0.5 mm ø (0.03 mm ø)		
		E3x-NA□F	9	0.5 mm ø (0.3 mm ø)		

*1. Sensing distance beased on white paper.
*2. Indicates values for standard mode.

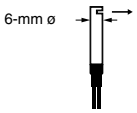
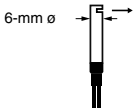
High resolution mode
Super long-distance mode
Green light
Standard mode
Super high-speed mode
Red light

Features	Appearance	Applicable Amplifier Unit	Sensing distance (mm)*1 (Parentheses: With E39-F1 Lens Unit)	Standard object (min. sensing object*2) (Parentheses: Opaque object)	Model	Permissible bending radius
Screw-mounting type Free-cut		E3x-DA□-S	4,500 3,400 900	4 mm ø (0.1 mm ø)	E32-T14	25 mm
		E3x-DAG□-S E3x-DAB□-S	320 260 160			
		E3x-DA□-N	4,000 3,400 1,250	4 mm ø (0.01 mm ø)		
		E3x-DAB11-N	320 260 160			
		E3x-DAH□-N	1,120 900 330			
		E3x-MDA	2,900 2,200 900	4 mm ø (0.1 mm ø)		
		E3x-NA□(V)	1,800	4.0 mm ø (0.03 mm ø)		
		E3x-NAG□	330			
		E3x-NA□F	540	4.0 mm ø (0.2 mm ø)		

*1. Sensing distance beased on white paper.
*2. Indicates values for standard mode.

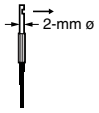
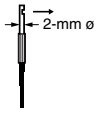
Diffuse reflective fiber units

High resolution mode
Super long-distance mode
Green light
Red light
Standard mode
Super high-speed mode
Infrared ray

Features	Appearance	Applicable Amplifier Unit	Sensing distance (mm)*1	Standard object*2 (min. sensing object: Gold wire)	Model	Permissible bending radius
6 mm ø Long distance Free-cut		E3x-DA□-S	200 110 36	200x200 (0.005 mm ø)	E32-D14L	25 mm
		E3x-DA□-N	150 110 50	200x200 (0.01 mm ø)		
		E3x-DAH□-N	35 25 10	50x50 (0.01 mm ø)		
		E3x-MDA	110 80 36	200x200 (0.005 mm ø)		
		E3x-NA□(V)	40	50x50 (0.03 mm ø)		
		E3x-NAG□	10	25x25 (0.3 mm ø)		
		E3x-NA□F	13	25x25 (0.03 mm ø)		
6 mm ø Free-cut		E3x-DA□-S	80 45 14	100x100 (0.005 mm ø)	E32-D14LR	1 mm
		E3x-DA□-N	60 45 25	100x100 (0.01 mm ø)		
		E3x-MDA	45 33 14	100x100 (0.005 mm ø)		
		E3x-NA□(V)	16	25x25 (0.03 mm ø)		
		E3x-NA□F	5			

*1. Sensing distance beased on white paper.
*2. Indicates values for standard mode.

High resolution mode Standard mode
Super long-distance mode Super high-speed mode
Green light Red light Infrared ray

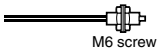
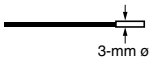
Features	Appearance	Applicable Amplifier Unit	Sensing distance (mm)*1				Standard object*2 (min. sensing object: Gold wire)	Model	Permissible bending radius
2 mm ø small ø; space-saving Free.cut		E3x-DA□-S	□50 ■30 ▮8				50x50 (0.005 mm ø)	E32-D24	10 mm
		E3x-DA□-N	■40 ■30 ▮10				50x50 (0.01 mm ø)		
		E3x-MDA	□30 ■22 ▮8				50x50 (0.005 mm ø)		
		E3x-NA□(V)	▮15				25x25 (0.03 mm ø)		
		E3x-NAG□	▮2.4				25x25 (0.3 mm ø)		
		E3x-NA□F	▮5				25x25 (0.03 mm ø)		
		E3x-DA□-S	□26 ■15 ▮4				50x50 (0.005 mm ø)	E32-D24R	1 mm
		E3x-DA□-N	■25 ■15 ▮6				50x50 (0.01 mm ø)		
		E3x-MDA	□15 ■10 ▮4				50x50 (0.005 mm ø)		
		E3x-NA□(V)	▮7				25x25 (0.03 mm ø)		
		E3x-NA□F	▮2.3						

*1. Sensing distance beased on white paper.
*2. Indicates values for standard mode.

Coaxial fiber

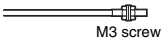
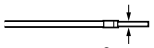
Diffuse reflective fiber units

High resolution mode | Standard mode
Super long-distance mode | Super high-speed mode
Green light | Red light | Infrared ray

Features	Appearance	Applicable Amplifier Unit	Sensing distance (mm)*1	Standard object*2 (min. sensing object: Gold wire)	Model	Permissible bending radius
M6 coaxial; high-precision positioning Free-cut		E3X-DA□-S	500 300 90	500x500 (0.005 mm ø)	E32-CC200	25 mm
		E3X-DAG□-S E3X-DAB□-S	32 25 16	100x100 (0.1 mm ø)		
		E3X-DA□-N	400 300 100	500x500 (0.01 mm ø)		
		E3X-DAB#-N	32 25 16	100x00 (0.1 mm ø)		
		E3X-DAH□-N	100 75 25	100x100 (0.01 mm ø)		
		E3X-MDA	300 210 90	500x500 (0.005 mm ø)		
		E3X-NA□(V)	150	200x200 (0.01 mm ø)		
		E3X-NAG□	25	50x50 (0.1 mm ø)		
		E3X-NA□F	50	75x75 (0.015 mm ø)		
3 mm ø; small ø; coaxial; high-precision positioning Free-cut		E3X-DA□-S	250 150 45	300x300 (0.005 mm ø)	E32-D32L	25 mm
		E3X-DA□-N	200 150 50	300x300 (0.01 mm ø)		
		E3X-MDA	150 100 45	300x300 (0.005 mm ø)		
		E3X-NA□(V)	80	100x100 (0.01 mm ø)		
		E3X-NAG□	12	25x25 (0.1 mm ø)		
		E3X-NA□F	25	50x50 (0.02 mm ø)		

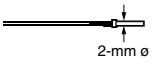
*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.
*3. Refer to page “AB-” when using the optional lens unit

High resolution mode | Standard mode
Super long-distance mode | Super high-speed mode
Green light | Red light | Infrared ray

Features	Appearance	Applicable Amplifier Unit	Sensing distance (mm)*1	Standard object*2 (min. sensing object: Gold wire)	Model	Permissible bending radius
M3 coaxial high precision positioning Free-cut Small spot lens mountable (E39-F3A, F3A-5, F3B, F3C)	 M3 screw	E3X-DA□-S	120 75 22 Spot ø*3 • Adjustable in the range 0.1 to 0.6-mm ø	100x100 (0.005 mm ø)	E32-EC31	25 mm
		E3X-DA□-N	100 75 25 Spot ø Adjustable in the range 0.5 to 1.0 mm ø.	100x100 (0.01 mm ø)		
		E3X-MDA	75 50 22	100x100 (0.005 mm ø)		
		E3X-NA□(V)	40	50x50 (0.01 mm ø)		
		E3X-NAG□	6	25x25 (0.1 mm ø)		
		E3X-NA□F	13	25x25 (0.02 mm ø)		
M3 coaxial high precision positioning Free-cut Small spot lens mountable (E39-F3A, F3A-5, F3B, F3C)	 M3 screw	E3X-DA□-S	50 35 8 Spot ø • 0.1-mm ø • 0.2-mm ø • 4.0-mm ø max	50x50 (0.005 mm ø)	E32-EC41	
		E3X-DA□-N	45 35 10 Spot ø • 0.1 mm ø • 0.2 mm ø • 4.0 mm ø max.	50x50 (0.01 mm ø)		
		E3X-MDA	35 22 8	50x50 (0.005 mm ø)		
		E3X-NA□(V)	15	25x25 (0.01 mm ø)		
		E3X-NA□F	5	25x25 (0.02 mm ø)		
2 mm ø coaxial; high-precision positioning Small spot lens mountable (E39-F3A,)	 2-mm ø	E3X-DA□-S	50 35 8 Spot ø • Adjustable in the range 0.1 to 0.6-mm ø.	50x50 (0.005 mm ø)	E32-C42	
		E3X-DA□-N	45 35 10 Spot ø • Adjustable in the range 0.1 to 0.6 mm ø	50x50 (0.01 mm ø)		
		E3X-MDA	35 22 8	50x50 (0.005 mm ø)		
		E3X-NA□(V)	15	25x25 (0.01 mm ø)		
		E3X-NA□F	5	25x25 (0.02 mm ø)		

*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.
*3. Refer to page “AB-” when using the optional lens unit

High resolution mode / Standard mode
Super long-distance mode / Super high-speed mode
Green light / Red light / Infrared ray

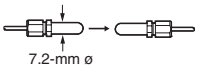
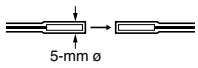
Features	Appearance	Applicable Amplifier Unit	Sensing distance (mm)*1	Standard object*2 (min. sensing object: Gold wire)	Model	Permissible bending radius
2 mm ø coaxial; high-precision positioning Free-cut Small spot lens mountable (E39-F3A,)		E3X-DA□-S	120 75 22 Spot ø*3 • Adjustable in the range 0.1 to 0.6-mm ø	100x100 (0.005 mm ø)	E32-D32	25 mm
		E3X-DA□-N	100 75 25	100x100 (0.01 mm ø)		
		E3X-MDA	75 52 22	100x100 (0.005 mm ø)		
		E3X-NA□(V)	40	50x50 (0.01 mm ø)		
		E3X-NAG□	6	25x25 (0.1 mm ø)		
		E3X-NA□F	13	25x25 (0.02 mm ø)		

*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.
*3. Refer to page “AB-” when using the optional lens unit

Chemical resistant

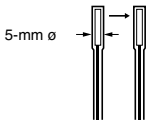
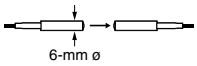
Throughbeam fiber unit

High resolution mode / Standard mode
Super long-distance mode / Super high-speed mode
Green light / Red light

Features	Appearance	Applicable Amplifier Unit	Sensing distance (mm)*1 (Parentheses: With E39-F1 Lens Unit)	Standard object*2 (min. sensing object) (Parentheses: Opaque object)	Model	Permissible bending radius
PTFE-covered; round head that resists water drops Free-cut		E3X-DA□-S	2,500 2,000 520	4 mm ø (0.1 mm ø)	E32-T11F	4 mm
		E3X-MDA	1,600 1,300 520	4 mm ø (0.1 mm ø)		
PTFE-covered; withstands chemicals and harsh environments (operating ambient temperature: -30°C to 70°C) Free-cut		E3X-DA□-S	4,000 3,000 800	4 mm ø (0.1 mm ø)	E32-T12F	40 mm
		E3X-DA□-N	3,800 3,000 1,100	4 mm ø (0.01 mm ø)		
		E3X-MDA	2,600 2,000 800	4 mm ø (0.1 mm ø)		
		E3X-NA□(V)	1,600	4.0 mm ø (0.2 mm ø)		
		E3X-NAG□	300			
		E3X-NA□F	480	4.0 mm ø (0.7 mm ø)		

*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.

High resolution mode
Super long-distance mode
Green light
Standard mode
Super high-speed mode
Red light

Features	Appearance	Applicable Amplifier Unit	Sensing distance (mm)*1 (Parentheses: With E39-F1 Lens Unit)	Standard object*2 (min. sensing object) (Parentheses: Opaque object)	Model	Permissible bending radius
PTFE-covered; withstands chemicals and harsh environments; side-view (operating ambient temperature: −30°C to 70°C) Free-cut		E3X-DA□-S	500 400 100	3 mm ø (0.1 mm ø)	E32-T14F	
		E3X-DA□-N	500 400 150	3 mm ø (0.01 mm ø)		
		E3X-MDA	320 250 100	3 mm ø (0.1 mm ø)		
		E3X-NA□(V)	200	3.0 mm ø (0.2 mm ø)		
		E3X-NAG□	37			
		E3X-NA□F	60	3.0 mm ø (0.7 mm ø)		
PTFE; withstands chemicals and harsh environments (operating ambient temperature: −40°C to 200°C)		E3X-DA□-S	920 700 190	1.0 mm ø (0.005 mm ø)	E32-T81F-S	10 mm
		E3X-DA□-N	880 700 260	1 mm ø (0.01 mm ø)		
		E3X-MDA	600 460 190	1.0 mm ø (0.005 mm ø)		
		E3X-NA□(V)	350	1.0 mm ø (0.2 mm ø)		
		E3X-NA□F	100	1.0 mm ø (0.5 mm ø)		

*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.

Diffuse reflective fiber units

High resolution mode
Super long-distance mode
Green light
Standard mode
Super high-speed mode
Red light

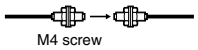
Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1	Standard object*2 (min. sensing object: Gold wire)	Model	Permissible bending radius
PTFE-covered; withstands chemicals and harsh environments (operating ambient temperature: -30°C to 70°C Free-cut	 6-mm ø	E3X-DA□-S	160 95 30	200x200 (0.005 mm ø)	E32-D12F	40 mm
		E3X-DA□-N	120 95 45	200x200 (0.01 mm ø)		
		E3X-MDA	95 70 30	200x200 (0.005 mm ø)		
		E3X-NA□(V)	50	100x100 (0.03 mm ø)		
		E3X-NAG□	8	25x25 (0.3 mm ø)		
		E3X-NA□F	16	25x25 (0.03 mm ø)		

*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.

Heat resistant

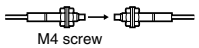
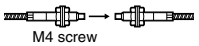
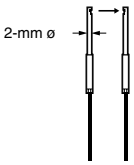
Throughbeam fiber unit

High resolution mode
Super long-distance mode
Red light
Standard mode
Super high-speed mode

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1 (Parentheses: With E39-F1 Lens Unit)	Standard object*2 (min. sensing object) (Parentheses: Opaque object)	Model	Permissible bending radius
Resists 150°C*3; fiber sheath fiber sheat material: fluorine resin (operating ambient temperature: -40°C to 150°C) Free-cut	 M4 screw	E3X-DA□-S	1,000 760 200	1.5 mm ø (0.1 mm ø)	E32-ET51	35 mm
		E3X-DA□-N	950 760 280	1.5 mm ø (0.01 mm ø)		
		E3X-MDA	650 500 200	1.5 mm ø (0.1 mm ø)		
		E3X-NA□(V)	400	1.5 mm ø (0.03 mm ø)		
		E3X-NA□F	120	1.5 mm ø (1 mm ø)		

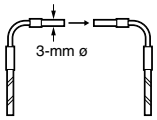
*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.
*3. For continuous operation, us the products within the temperature ranging from -40°C to 130°C.
*4. Indicates the heat resistant temperature at the fiber tip.
*5. Longer sensing distance by using the lens unit E39-F1.

High resolution mode
Standard mode
Super long-distance mode
Super high-speed mode
Red light

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1 (Parentheses: With E39-F1 Lens Unit)	Standard object*2 (min. sensing object) (Parentheses: Opaque object)	Model	Permissible bending radius
Resists 200°C; flexible (R10); fiber sheath material: PTFE (operating ambient temperature: -40°C to 200°C)	 M4 screw	E3X-DA□-S	360 (2,650) 280 (2,100) 70 (520)	1.0 mm ø (0.005 mm ø)	E32-T81R-S NEW	10 mm
		E3X-DA□-N	350 280 100	1.5 mm ø (0.01 mm ø)		
		E3X-MDA	230 (1,700) 180 (1,300) 70 (520)	1.0 mm ø (0.005 mm ø)		
		E3X-NA□(V)	180	1.0 mm ø (0.2 mm ø)		
		E3X-NA□F	50	1.0 mm ø (0.5 mm ø)		
Resists 350°C*4, with spiral tube; high mechanical strength; fiber sheath material: stainless steel (operating ambient temperature: -60°C to 350°C)	 M4 screw	E3X-DA□-S	600 (4,000)*6 450 (3,400) 120 (900)	1.0 mm ø (0.005 mm ø)	E32-T61-S NEW	25 mm
		E3X-DA□-N	570 (4,000)*6 450 (3,400) 170 (1,300)	1 mm ø (0.01 mm ø)		
		E3X-MDA	390 (3,000) 300 (2,200) 120 (900)	1.0 mm ø (0.005 mm ø)		
		E3X-NA□(V)	300 (3,000)	1.0 mm ø (0.03 mm ø)		
		E3X-NA□F	90	1.0 mm ø (0.5 mm ø)		
Side-view; resists 150°C*3; suitable for detecting minute sensing objects; fiber sheath material: fluorine resin (operating ambient temperature: –40°C to 150°C) Free-cut	 2-mm ø	E3X-DA□-S	300 230 60	1.0 mm ø (0.005 mm ø)	E32-T54	35 mm
		E3X-DA□-N	290 230 80	1 mm ø (0.01 mm ø)		
		E3X-MDA	190 150 60	1.0 mm ø (0.005 mm ø)		
		E3X-NA□(V)	130	1.0 mm ø (0.03 mm ø)		
		E3X-NA□F	35	1.0 mm ø (0.3 mm ø)		

*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.
*3. For continuous operation, us the products within the temperature ranging from -40°C to 130°C.
*4. Indicates the heat resistant temperature at the fiber tip.
*5. Longer sensing distance by using the lens unit E39-F1.

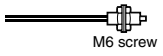
High resolution mode
Super long-distance mode
Red light
Standard mode
Super high-speed mode

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1 (Parentheses: With E39-F1 Lens Unit)	Standard object*2 (min. sensing object) (Parentheses: Opaque object)	Model	Permissible bending radius
Resists 200°C*4; L-shaped; fiber sheath material: stainless steel SUS		E3X-DA□-S	1,750 1,300 350	1.7 mm ø (0.1 mm ø)	E32-T84S-S NEW	25 mm
		E3X-DA□-N	1,700 1,300 500	1.7 mm ø (0.01 mm ø)		
		E3X-MDA	1,100 870 350	1.7 mm ø (0.1 mm ø)		
		E3X-NA□(V)	700	1.7 mm ø (0.03 mm ø)		
		E3X-NA□F	210	1.7 mm ø (0.4 mm ø)		

*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.
*3. For continuous operation, us the products within the temperature ranging from -40°C to 130°C.
*4. Indicates the heat resistant temperature at the fiber tip.
*5. Longer sensing distance by using the lens unit E39-F1.

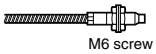
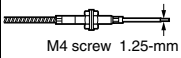
Diffuse reflective fiber unit

High resolution mode
Super long-distance mode
Red light
Standard mode
Super high-speed mode

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1	Standard object*2 (min. sensing object: Gold wire)	Model	Permissible bending radius
Resists 150°C*3; fiber sheath material: fluorine resin (operating ambient temperature: -40°C to 150°C) Free-cut		E3X-DA□-S	400 230 72	200x200 (0.005 mm ø)	E32-ED51	35 mm
		E3X-DA□-N	300 230 100	200x200 (0.01 mm ø)		
		E3X-MDA	230 165 72	100x100 (0.005 mm ø)		
		E3X-NA□(V)	120	150x150 (0.03 mm ø)		
		E3X-NA□F	40	50x50 (0.03 mm ø)		
Resists 200°C*4; fiber sheath material: fluorine resin (operating ambient temperature: -40°C to 200°C)		E3X-DA□-S	150 90 27	200x200 (0.005 mm ø)	E32-D81R-S E32-D81R	10 mm
		E3X-DA□-N	120 90 30	200x200 (0.01 mm ø)		
		E3X-MDA	90 63 27	100x100 (0.005 mm ø)		

*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.
*3. For continius operation use the product within a temperature range of -40° to 130°C.
*4. Indicates the heat-resistant temperature at the fiber tip.

High resolution mode
Super long-distance mode
Red light
Standard mode
Super high-speed mode

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1	Standard object*2 (min. sensing object: Gold wire)	Model	Permissible bending radius
Resists 350°C*4; fiber sheath material: stainless steel (operating ambient temperature: -60°C to 350°C)	 M6 screw	E3X-DA□-S	150 90 27	200×200 (0.005 mm ø)	E32-D61-S NEW	25 mm
		E3X-MDA	90 60 27			
300°C Operating ambient temperature: -40 to +300°C Fiber sheath material: SUS	 M6 screw	E3X-DA□-N	120 90 30	200x200 (0.01 mm ø)	E32-D61 NEW	
		E3X-NA□(V)	45	100x100 (0.03 mm ø)		
		E3X-NA□F	15	25x25 (0.03 mm ø)		
400°C Operating ambient temperature: -40 to +400°C Fiber sheath material: SUS	 M4 screw 1.25-mm ø	E3X-DA□-N	80 60 20	100x100 (0.01 mm ø)	E32-D73	25 mm
		E3X-NA□(V)	30	50x50 (0.03 mm ø)		
		E3X-NA□F	10	25x25 (0.03 mm ø)		
Resists 400°C*4; fiber sheath material: stainless steel (operating ambient temperature: -40°C to 400°C)		E3X-DA□-S	100 60 18	200x200 (0.005 mm ø)	E32-D73-S NEW	
		E3X-MDA	60 40 18			

*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.
*3. For continius operation use the product within a temperature range of -40° to 130°C.
*4. Indicates the heat-resistant temperature at the fiber tip.

Grooved

Throughbeam fiber unit

High resolution mode
Super long-distance mode
Green light
Standard mode
Super high-speed mode
Red light

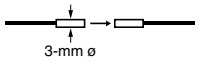
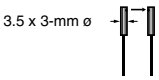
Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1 (Parentheses: With E39-F1 Lens Unit)				Standard object*2 (min. sensing object) (Parentheses: Opaque object)	Model	Permissible bending radius
Suitable for film sheet detection; no optical axis adjustment required; easy to mount Free-cut		E3X-DA□-S	10 10 10				4.0 mm ø (0.1 mm ø)	E32-G14	25 mm
		E3X-DAG□-S E3X-DAB□-S	10 10 10						
		E3X-DA□-N	10 10 10				4.0 mm ø (2.0 mm ø)		
		E3X-DAB#-N	10 10 10						
		E3X-DAH□-N	10 10 10						
		E3X-MDA	10 10 10				4.0 mm ø (0.1 mm ø)		
		E3X-NA□(V)	10						
		E3X-NAG□	10						
		E3X-NA□F	10				4.0.0 mm ø (1.0 mm ø)		

*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.

Narrow Vision Field

Throughtbeam fiber unit

High resolution mode
Super long-distance mode
Red light
Standard mode
Super high-speed mode

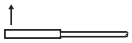
Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1 (Parentheses: With E39-F1 Lens Unit)	Standard object*2 (min. sensing object) (Parentheses: Opaque object)	Model	Permissible bending radius
Suitable for detecting wafers Free-cut		E3X-DA□-S	2,500 1,900 500	1.7 mm ø (0.1 mm ø)	E32-T22S	25 mm
		E3X-DA□-N	2,300 1,900 700	1.7 mm ø (0.01 mm ø)		
		E3X-MDA	1,600 1,250 500	1.7 mm ø (0.1 mm ø)		
		E3X-NA□(V)	1,000	1.7 mm ø (0.5 mm ø)		
		E3X-NA□F	300			
Side-view; suitable for detecting wafers Free-cut		E3X-DA□-S	1,750 1,300 350	2 mm ø (0.1 mm ø)	E32-T24S	10 mm
		E3X-DA□-N	1,700 1,300 500	2 mm ø (0.01 mm ø)		
		E3X-MDA	1,100 870 350	2 mm ø (0.1 mm ø)		
		E3X-NA□(V)	700	2.0 mm ø (0.03 mm ø)		
		E3X-NA□F	210	2.0 mm ø (0.5 mm ø)		

*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.

Limited-reflective

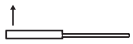
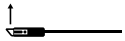
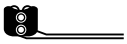
Diffuse reflective fiber units

High resolution mode
Super long-distance mode
Red light
Standard mode
Super high-speed mode

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1				Standard object*2 (min. sensing object: Gold wire)	Model	Permissible bending radius
Suitable for positioning of crystal glass Free-cut		E3X-DA□-S	0 to 15 0 to 15 0 to 15				100x100 Soda glass with reflection factor of 7%	E32-L16 NEW	25 mm
		E3X-DA#-N	0 to 15 0 to 15 0 to 15						
		E3X-MDA	0 to 15 0 to 15 0 to 15						
		E3X-NA#(V)	0 to 15						
		E3X-NA#F	0 to 13						
Suitable for positioning of crystal glass Free-cut		E3X-DA□-S	4 to 12 4 to 12 4 to 12					E32-L56E1 E32-L56E2	35 mm
		E3X-DA□-N	4 to 12 4 to 12 4 to 12						
		E3X-MDA	4 to 12 4 to 12 4 to 12						
		E3X-NA□(V)	4 to 12				---		
		E3X-NA□F	4 to 12						
Suitable for positioning of crystal glass Heat resists up to 300°C Free-cut		E3X-DA□-S	5 to 18 5 to 18 5 to 18				100x100 Soda glass with reflection factor of 7%	E32-L66 NEW	25 mm
		E3X-DA#-N	5 to 18 5 to 18 5 to 18						
		E3X-MDA	5 to 18 5 to 18 5 to 18						
		E3X-NA#(V)	5 to 18						
		E3X-NA#F	7 to 14						

*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.

High resolution mode
Super long-distance mode
Red light
Standard mode
Super high-speed mode

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1	Standard object*2 (min. sensing object: Gold wire)	Model	Permissible bending radius
Siutable for crystal glass detection Thin and compact type Free-cut		E3X-DA□-S	0 to 4 0 to 4 0 to 4	25x25 (0.005 mm ø)	E32-L24S NEW	10 mm
		E3X-DA#-N				
		E3X-MDA	0 to 4 0 to 4 0 to 4			
		E3X-NA#(V)	0 to 4	25x25		
		E3X-NA#F	0 to 4			
Detects wafers and small differences in height; (operating ambient temperature: -40° C to 105° C); degree of protection: IEC60529 IP50 Free-cut		E3X-DA□-S	4±2 4±2 4±2	25x25 (0.005 mm ø)	E32-L24L	10 mm
		E3X-DA□-N	4 ±2 4 ±2 4 ±2	25x25 (0.01 mm ø)		
		E3X-MDA	4±2 4±2 4±2	25x25 (0.005 mm ø)		
		E3X-NA□(V)	4 ± 2	25x25 (0.015 mm ø)		
		E3X-NA□F	4 ± 2	25x25 (0.03 mm ø)		
		E3X-DA□-S	7.2±1.8 7.2±1.8 7.2±1.8	25x25 (0.005 mm ø)	E32-L25L	10 mm
		E3X-DA□-N	7.2 ±1.8 7.2 ±1.8 7.2 ±1.8	25x25 (0.01 mm ø)		
		E3X-MDA	7.2±1.8 7.2±1.8 7.2±1.8	25x25 (0.005 mm ø)		
		E3X-NA□(V)	7.2±1.8	25x25 (0.015 mm ø)		
		E3X-NA□F	7.2±1.8	25x25 (0.03 mm ø)		

*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.

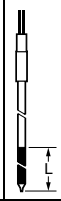
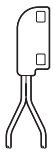
High resolution mode
Super long-distance mode
Red light
Standard mode
Super high-speed mode

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1				Standard object*2 (min. sensing object: Gold wire)	Model	Permissible bending radius
Detects wafers and small differences in height; degree of protection: IEC60529 IP50 Free-cut		E3X-DA□-S	3.3 3.3 3.3				25x25 (0.005 mm ø)	E32-L25	25 mm
		E3X-DA□-N	3.3 3.3 3.3				25x25 (0.01 mm ø)		
		E3X-MDA	3.3 3.3 3.3				25x25 (0.005 mm ø)		
		E3X-NA□(V)	3.3				25x25 (0.015 mm ø)		
		E3X-NA□F	3.3				25 x 25 (0.03 mm ø)		
		E3X-DA□-S	3.3 3.3 3.3				25x25 (0.005 mm ø)	E32-L25A	25 mm
		E3X-DA□-N	3.3 3.3 3.3				25x25 (0.01 mm ø)		
		E3X-MDA	3.3 3.3 3.3				25x25 (0.005 mm ø)		
		E3X-NA□(V)	3.3				25x25 (0.015 mm ø)		
		E3X-NA□F	3.3				25x25 (0.03 mm ø)		

*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.

Fluid-level Detection Fiber Units

Diffuse reflective fiber units

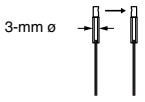
Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1	Standard object*2 (min. sensing object: Gold wire)	Model	Permissible bending radius
Fluid contact type: unbendable section L 150 mm, 350 mm (two types); (operating ambient temperature: -40° C to 200° C)		E3X-DA□-S DA□-N E3X-MDA NA□(V NA□F	---	Pure water at 25° C	E32-D82F1 E32-D82F2	40 mm
Tube-mounting type; Light ON when fluid is present; minimal influence from bubbles and water drops Free-cut		E3X-DA□-S DA□-N E3X-MDA	Applicable tube: FEP, transparent tube,. 3.2, 6.4, 9.5 mm ø, wall thickness 1mm		E32-A01	4 mm
Tube-mounting type; light ON when fluid is present; minimal influence from bubbles and water drops Free-cut		E3X-DA□-S DA□-N E3X-MDA	Applicable tube: FEP, transparent tube,. 6- to 13 mm ø, wall thickness 1mm		E32-A02	
Tube-mounting type; dense mounting to detect level differences of 4 mm Free-cut		E3X-DA□-S DA□-N E3X-MDA NA□(V) NA□F	Applicable tube: FEP, transparent tube,. 8- to 10 mm ø, wall thickness 1mm ---	 ---	E32-L25T	10 mm
PTFE-covered Tube-mounting type; unlimited tube diameter; minimal influence from bubbles and water drops Free-cut		E3X-DA□-S E3X-MDA	Applicable tube: Transparent tube Tube diameter: No restriction (Tube must be FEP or material with equivalent transparency)		E32-D36F	4 mm

*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.

Mapping sensors

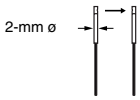
Diffuse reflective fiber units

High resolution mode
Super long-distance mode
Standard mode
Super high-speed mode

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1	Standard object*2 (min. sensing object: Gold wire)	Model	Permissible bending radius
Super-narrow vision field; side-view; opening angle: 1.5°; simple adjustment Free-cut		E3X-DA□-S	1,150 890 250	2 mm ø (0.1 mm ø)	E32-A03	1 mm
		DA□-N	1,100 890 500	2 mm ø (0.01 mm ø)		
		E3X-MDA	750 580 250	2 mm ø (0.1 mm ø)		
		NA□(V)	---	---		
		NA□F				

*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.

High resolution mode / Standard mode / Super long-distance mode / Super high-speed mode

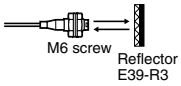
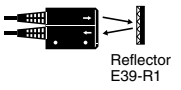
Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1	Standard object*2 (min. sensing object: Gold wire)	Model	Permissible bending radius
Super-narrow vision field; small; side-view; opening angle: 3°; simple adjustment Free-cut		E3X-DA□-S	460 340 100	1.2 mm ø (0.1 mm ø)	E32-A04	10 mm
		DA□-N	440 340 170	1.2 mm ø (0.01 mm ø)		
		E3X-MDA	300 220 100	1.2 mm ø (0.1 mm ø)		
		NA□(V)	---	---		
		NA□F				

*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.

Retroreflective

Diffuse reflective fiber

High resolution mode / Standard mode / Super long-distance mode / Super high-speed mode / Red light

Features	Shape	Applicable Amplifier Unit	Sensing distance (mm)*1	Standard object*2 (min. sensing object: Gold wire)	Model	Permissible bending radius
Opaque object detection Free-cut		E3X-DA□-S	10 to 250 10 to 250 10 to 250	35 mm ø (0.1 mm ø)	E32-R21 + E39-R3 (Attachment)	10 mm
		E3X-DA□-N	10 to 250 10 to 2 50 10 to 250			
		E3X-MDA	10 to 250 10 to 250 10 to 250			
		E3X-NA□(V)	10 to 250	35.0 mm ø (0.3 mm ø)		
		E3X-NA□F	10 to 250	35.0 mm ø (0.5 mm ø)		
Opaque object detection		E3X-DA□-S	150 to 1,500 150 to 1,500 150 to 1,500	35 mm ø (0.2 mm ø)	E32-R16 + E39-R1 (Attachment)	25 mm
		E3X-DA□-N	150 to 1,500 150 to 1,500 150 to 1,500			
		E3X-MDA	150 to 1,500 150 to 1,500 150 to 1,500			
		E3X-NA□(V)	150 to 1500	35.0 mm ø (0.6 mm ø)		
		E3X-NA□F	150 to 1000	35.0 mm ø (0.4 mm ø)		

*1. Sensing distance based an white paper.
*2. Indicates values for standard mode.

Rating/Performance

Fiber Units

Through-beam fiber unit

Type/application / Item		Long distance, general purpose, Thin fiber, side view	Flexible (break-resistant)	Chemical resistant	
			E32-T11, E32-T21, E32-T22B	E32-T12F, E32-T14F	E32-T81F
Ambient temperature	Operation	-40°C to 70°C (with no icing or condensation)			-40° to 200°C (with no icing or condensation)
	Storage				-40° to 110°C (with no icing or condensation)
Ambient humidity		Operating: 35% to 85% RH, Storage: 35% to 95% RH (with no icing or condensation)			
Admissible bending radius		25 mm min. (10 mm min. for 1 mm dia. fiber)	4 mm min.	40 mm min.	10 mm min.
Fiber sheath material		Black polyethylene	Vinyl chloride	PTFE covered	
Protective structure		IEC 60529 IP67			

Type/application / Item		Flexible					
		E32-T12R	E32-T22R	E32-T16WR	E32-T16JR E32-T16PR	E32-T24R	E32-T14LR E32-ET11R E32-ET21R
Ambient temperature	Operation	-40° to 70°C (with no icing or condensation)		-25°C to 55°C (with no icing or condensation)	-40° to 70°C (with no icing or condensation)		
	Storage	-40° to 70°C (with no condensation)					
Ambient humidity		Operating: 35% to 85% RH, Storage: 35% to 95% RH (with no icing or condensation)					
Admissible bending radius		1 mm min.					
Fiber sheath material		Mixed vinyl chloride	Black polyethylene	Mixed vinyl chloride		Black polyethylene	Mixed vinyl chloride
Protective structure		IEC 60529 IP67		IEC 60529 IP50		IEC 60529 IP67	

Type/application / Item		Heat resistant				
		300 °C	200°C		150°C	
		E32-T61-S	E32-T84S	E32-T81R-S	E32-ET51	E32-T54
Ambient temperature	Operation	-40° to 300°C *1 (with no icing or condensation)	-40° to 200°C (with no icing or condensation)	-40° to 200°C (with no icing or condensation)	-40° to 150°C *2 (with no incing or condensation)	
	Storage	-40° to 110°C (with no icing or condensation)				
Ambient humidity		Operating: 35% to 85% RH, Storage: 35% to 95% RH (with no icing or condensation)				
Admissible bending radius		25 mm min.		10 mm min.	35 mm min.	
Fiber sheath material		SUS303		Fluororesin		
Protective structure		IEC 60529 IP67				

*1 Since the heat resistance changes depending on the fiber area, refer to the external dimensions.
*2 For continuous operation, use the products within a temperature range of -40°C to 130°C

Item \ Type/application		Slot Sensor	Narrow vision field	Area sensing			
		E32-G14	E32-T22S E32-T24S	E32-T16W	E32-T16J	E32-T16	E32-T16P
Ambient temperature	Operation	-40° to 70°C (with no icing or condensation)		-25°C to 55°C (with no icing or condensation)	-40° to 70°C (with no icing or condensation)		
	Storage	-40° to 70°C (with no icing or condensation)					
Ambient humidity		Operating: 35% to 85% RH, storage: 35% to 95% RH (with no icing or condensation)					
Admissible bending radius		25 mm min.		10 mm min. (25 mm max. for E32-T16 only)			
Fiber sheath material		Black polyethylene	Mixed vinyl chloride	Vinyl chloride (black polyethylene for E32-T16 only)			
Protective structure		IEC 60529 IP67		IEC 60529 IP50 (IP67 for E32-T16 only)			

Item \ Type/application		Mapping Sensor	
		E32-A03	E32-A04
Ambient temperature	Operation	-40° to 70°C (with no icing or condensation)	
	Storage		
Ambient humidity		Operating: 35% to 85% RH, storage: 35% to 95% RH (with no icing or condensation)	
Admissible bending radius		1 mm min.	10 mm min.
Fiber sheath material		Black polyethylene	
Protective structure		IEC 60529 IP50	

Fiber Units with Reflective Sensor

Item \ Type/application		Long distance, general purpose, thin fiber, side view	Coaxial				Flexible (resists breaking)
			E32-EC31	E32-EC41	E32-C42	E32-D32	E32-D11, E32-D21, E32-D21B, E32-D22B
Differential distance		20% max. of sensing distance					
Ambient temperature	Operation	-40°C to 70°C (with no icing or condensation)					
	Storage						
Ambient humidity	Operation	35% to 85%RH (with no condensation)					
	Storage	35% to 95%RH (with no condensation)					
Admissible bending radius		25 mm min. (10 mm min. for 1 mm dia. fiber)	25 mm min.				4 mm min.
Fiber sheath material		Black polyethylene					Vinyl chloride
Protective structure		IEC 60529 IP67					

Item \ Type/application		Flexible			
		E32-D12R	E32-D22R, E32-D24R	E32-D14LR, E32-ED11R	E32-ED21R
Differential distance		20% max. of sensing distance			
Ambient temperature	Operation	-40°C to 70°C (with no icing or condensation)			
	Storage				
Ambient humidity	Operation	35% to 85%RH (with no condensation)			
	Storage	35% to 95%RH (with no condensation)			
Admissible bending radius		1 mm min.			
Fiber sheath material		Mixed vinyl chloride	Black polyethylene	Mixed vinyl chloride	Black polyethylene
Protective structure		IEC 60529 IP67			

Type/application / Item		Chemical resistance	Heat resistance			
		E32-D12F	150°C	200°C	300 °C	400 °C
			E32-ED51	E32-D81R	E32-D61	E32-D73
Differential distance		20% max. of sensing distance				
Ambient temperature	Operation	-30°C to 70°C (with no incing or condensation)	-40° to 150°C *1(with no incing or condensation)	-40° to 200°C (with no icing or condensation)	-40° to 300°C *2(with no icing or condensation)	-40° to 400°C (with no icing or condensation)
	Storage	-30°C to 70°C (with no incing or condensation)	-40° to 110°C (with no icing or condensation)			
Ambient humidity		Operating: 35% to 85% RH, Storage: 35% to 95% RH (with no icing or condensation)				
Admissible bending radius		40 mm min.	35 mm min.	10 mm min.	25 mm min.	
Fiber sheath material		PTFE covered	Fluororesin		SUS	
Protective structure		IEC 60529 IP67				

*1 For continuous operation, use the products within a temperature range of -40°C to 130°C
*2 Since the heat resistance changes depending on the fiber area, refer to the external dimensions on page AB- for details.

Type/application / Item		Retroreflective		Limited reflective		Area sensing
		E32-R21	E32-R16	E32-L25, E32-L25A	E32-L25L, E32-L24L	E32-D36P1
Differential distance		20% max. of sensing distance			5% max. of sensing distance	20% max. of sensing distance
Ambient temperature	Operation	-40° to 70°C (with no icing or condensation)	-25°C to 55°C (with no incing or condensation)	-40° to 70°C (with no icing or condensation)	-40°C to 105°C * (with no incing or condensation)	-40° to 70°C (with no icing or condensation)
	Storage	-40° to 70°C (with no icing or condensation)			-40°C to 95°C (with no incing or condensation)	-40° to 70°C (with no icing or condensation)
Ambient humidity		Operating: 35% to 85% RH, Storage: 35% to 95% RH (with no icing or condensation)				
Admissible bending radius		10 mm min.				25 mm min.
Fiber sheath material		Black polyethylene			Reinforced polyethylene	Black polyethylene
Protective structure		IEC 60529 IP67	IEC 60529 IP66	IEC 60529 IP50		---

* For continuous operation, use the products within a temperature range of -40°C to 90°C.

Type/application / Item / Model		Limited reflective
		E32-L56E1/E32-L56E2
Standard sensing object		Soda glass (SCG) having 7% reflection factor T=0.7 end face radius chamfering
Work inclination		2°
Sensing position accuracy		+0.1/-0.3
Differential distance		20% max. of sensing distance
Ambient temperature	Operation	0°C to 70°C *
	Storage	-40° to 70°C
Ambient humidity	Operation	35% to 85%
	Storage	35% to 95%
Protective structure		IEC 60529 IP40
Material	Case	Aluminum
	Cover	SPCC steel sheet
	Lens	Glass (BK7)
	Fiber cladding	Fluororesin

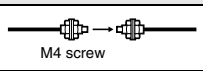
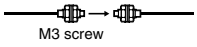
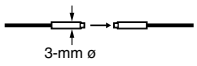
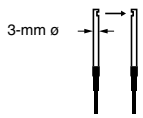
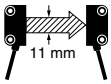
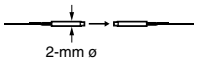
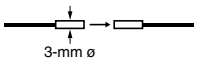
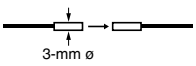
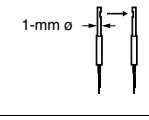
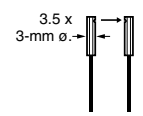
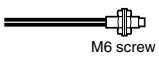
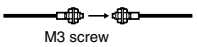
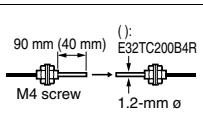
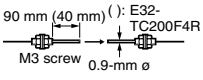
* +200°C for short-time use.

Flexible fiber unit

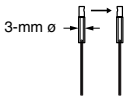
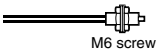
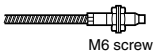
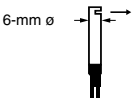
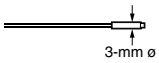
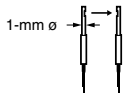
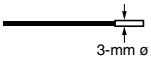
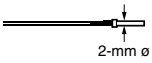
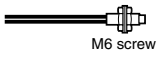
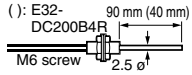
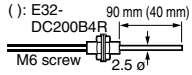
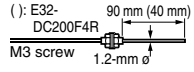
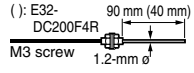
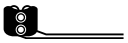
The following fibers are available as flexible type (1 week). (Up to 10 sets) Contact your trading company for the prices, delivery time and types.

Flexible fiber (R1) type

Throughbeam

Application	Shape	Model
General purpose		E32-ET11R
General purpose		E32-T12R
General purpose		E32-T14LR
Side view		E32-T16JR
Area sensing		E32-T16PR
Area sensing		E32-T16WR
Small fibre head		E32-T22R
Narrow vision field		E32-T22SR
Narrow vision field		E32-T24R
Small fibre head		E32-T24SR
Narrow vision field		E32-T81R-S
Small fibre head		E32-TC200AR
Heat resistance		E32-TC200B4R
General purpose		E32-TC200F4R
General purpose		
General purpose		

Reflective model

Application	Shape	Model
Mapping Sensor		E32-A03
Coaxial fibre		E32-CC200R
General purpose		E32-D12R
Side view		E32-D14LR
Small fibre heat		E32-D22R
Side view		E32-D24R
Coaxial fibre		E32-D32LR
Coaxial fibre		E32-D32R
Heat resisrant		E32-D81R
General purpose		E32-DC200B4R
General purpose		E32-DC200BR
General purpose		E32-DC200F4R
General purpose		E32-DC200FR
General purpose		E32-ED11R
General purpose		E32-ED21R
Limited reflective		E32-L24LR
Limited reflective		E32-L25LR
Liquid-level detection		E32-L25TR

Special compatibility of fiber units

Sensing distance (Unit: mm)

Fiber type	Amplifier type	Mode	Standard product	R5	R7.5	R10	R12.5
E32-TC200B	E3X-DA11-N	Super-long-distance	950	590	770	840	950
		Standard	760	470	610	670	760
		Super-high-speed	280	170	220	250	280
E32-TC200F		Super-long-distance	250	110	250	250	250
		Standard	220	100	220	220	220
		Super-high-speed	90	40	90	90	90
E32-DC200F		Super-long-distance	100	70	100	100	100
		Standard	80	55	80	80	80
		Super-high-speed	30	20	30	30	30

Long fiber type

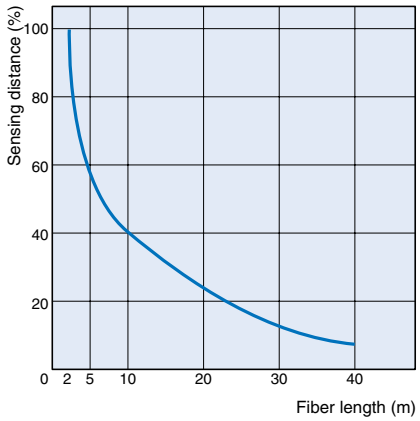
Applicable model (default type)

E32-T11L/-D11L, E32-TC200/-DC200, E32-TC200B/-DC200B, E32-TC200E/-DC200E, E32-TC200F/-DC200F, E32-TC200A4E32-T11/-D11

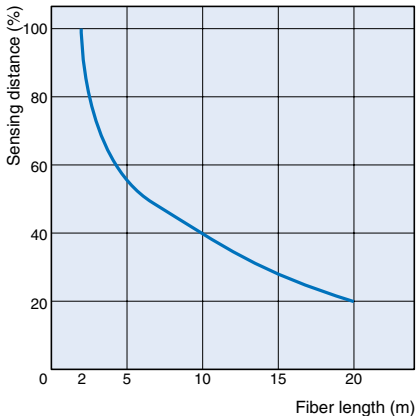
1 m increments in the range 6 m l 20 m [l=2 m, l=5 m (E32-T11L/E32-T11/E32-TC200/E32-DC200 only) are standard products.]

Fiber length vs. sensing distance

Through-beam fiber unit (assuming that the fiber length of 2 m is 100%)



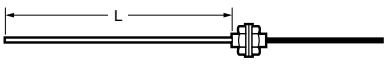
Reflective fiber unit (assuming that the fiber length of 2 m is 100%)



Different stainless steel tube length type

Applicable model

E32-TC200F (tube diameter 0.9 mm) E32-TC200B, E32-DC200F (tube diameter 1.2 mm) E32-DC200B (tube diameter 2.5 mm)



Can be produced within the range 10 mm L 120

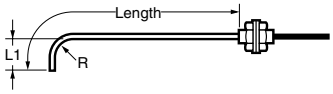
Tolerance: ±1 mm when L 40 mm, ±2 mm when L 40 mm (L=90 mm, L=40 mm is a standard product.)

Stainless steel tube front-end or root bent type

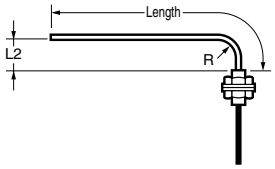
Applicable model

E32-TC200B, E32-TC200F, E32-DC200F

(When tube is bent at front end)



(When tube is bent at root)



Bending radius and L1, L2 dimensions (Unit: mm)

Bending radius	Control No.	L1		L2		SUS tube full length
		1	2	3	4	S□
R5	A	10	15	5	10	120 max.
R7.5	B	12.5	17.5	7.5	17.5	
R10	C	15	20	10	20	
R12.5	D	17.5	22.5	12.5	22.5	

Note: Only the products of the above dimensions can be manufactured. If the product is bent to other than the above dimension, the sleeve bender E39-F11 (option) is available.

Type list based on bending radius and L1, L2 dimensions

(When only L1 is specified) (Unit: mm)

Bending radius	L1 (±1)	Model
R5	10	E32-[*1]C200[*2]-S[*3]A1
	15	E32-[A]C200[A]-S[A]A2
R7.5	12.5	E32-[A]C200[A]-S[A]B1
	17.5	E32-[A]C200[A]-S[A]B2
R10	15	E32-[A]C200[A]-S[A]C1
	20	E32-[A]C200[A]-S[A]C2
R12.5	17.5	E32-[A]C200[A]-S[A]D1
	22.5	E32-[A]C200[A]-S[A]D2

*1 "T" for through-beam type, "D" for reflective type.
*2 B or "F" at the end of E32-TC200B.
*3 "50" for 50 mm full length. Full length 120 mm

(If only L2 is specified) (Unit: mm)

Bending radius	L2 (±1)	Model
R5	5	E32-[*1]C200[*2]-S[*3]A3
	10	E32-[A]C200[A]-S[A]A4
R7.5	7.5	E32-[A]C200[A]-S[A]B3
	17.5	E32-[A]C200[A]-S[A]B4
R10	10	E32-[A]C200[A]-S[A]C3
	20	E32-[A]C200[A]-S[A]C4
R12.5	12.5	E32-[A]C200[A]-S[A]D3
	22.5	E32-[A]C200[A]-S[A]D4

*1 "T" for through-beam type, "D" for reflective type.
*2 B or "F" at the end of E32-TC200B.
*3 "50" for 50 mm full length. Full length 120 mm

(When L1 and L2 are both specified) (Unit: mm)

Bending radius	L1 (±1)	L2 (±1)	Model
R5	10	5	E32-[*1]C200[*2]-A13
	10	10	E32-[A]C200[A]-A14
	15	5	E32-[A]C200[A]-A23
	15	10	E32-[A]C200[A]-A24
R7.5	12.5	7.5	E32-[A]C200[A]-B13
	12.5	17.5	E32-[A]C200[A]-B14
	17.5	7.5	E32-[A]C200[A]-B23
	17.5	17.5	E32-[A]C200[A]-B24
R10	15	10	E32-[A]C200[A]-C13
	15	20	E32-[A]C200[A]-C14
	20	10	E32-[A]C200[A]-C23
	20	20	E32-[A]C200[A]-C24
R12.5	17.5	12.5	E32-[A]C200[A]-D13
	17.5	22.5	E32-[A]C200[A]-D14
	22.5	12.5	E32-[A]C200[A]-D23
	22.5	22.5	E32-[A]C200[A]-D24

*1 "T" for through-beam type, "D" for reflective type.
*2 B or "F" at the end of E32-TC200B.

Precautions

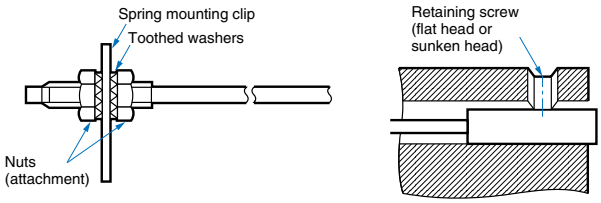
Fiber Units

Installation

Tightening Force

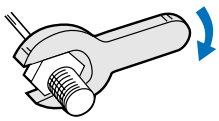
The tightening force applied to the Fiber Unit should be as follows:

Screw-mounting Model Cylindrical Model



Fiber Units	Clamping torque
M3/M4 screw	0.78 Nm max.
M6 screw/6-mm dia. column	0.98 Nm max.
1.5-mm dia. column	0.2 Nm max.
2-mm dia./3-mm dia. column	0.29 Nm max.
E32-T12F 5-mm dia. PTFE model	0.78 Nm max.
E32-D12F 6-mm dia. PTFE model	
E32-T16	0.49 Nm max.
E32-R21	0.59 Nm max.
E32-M21	0.49 Nm max. for up to 5 mm from front end, 0.78 Nm max. for more than 5 mm from front end
E32-L25A	0.78 Nm max.
E32-T16P E32-T16PR E32-T24S E32-L24L E32-L25L E32-T16J E32-T16JR	0.29 Nm max.
E32-T16W E32-T16WR	0.3 Nm max.

Use a proper-sized wrench.

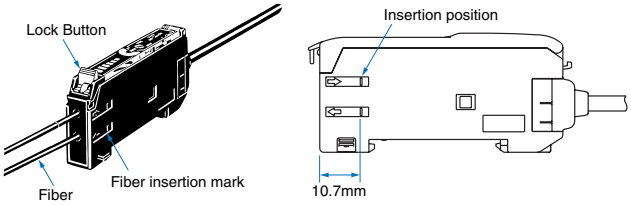


Fiber Connection and Disconnection

The E3X Amplifier Unit has a lock button. Connect or disconnect the fibers to or from the E3X Amplifier Unit using the following procedures:

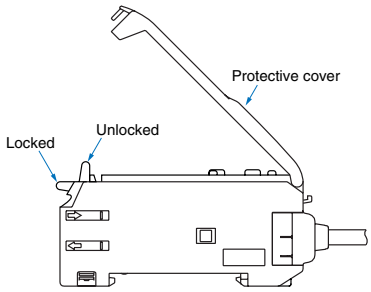
1. Connection

Open the protective cover, insert the fibers according to the fiber insertion marks on the side of the Amplifier Unit, and lower the lock button.



2. Disconnection

Remove the protective cover and raise the lock button to pull out the fiber.



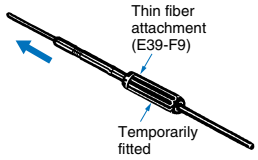
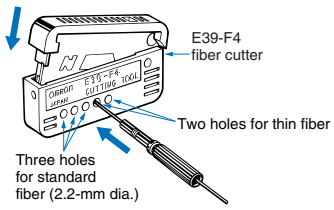
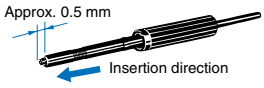
Note:To maintain the fiber properties, confirm that the lock is released before removing the fiber.

3. Precautions for Fiber Connection/Disconnection

Be sure to lock or unlock the lock button within an ambient temperature range between -10°C and 40°C.

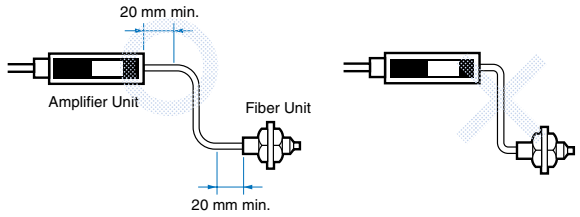
Cutting Fiber

- Insert a fiber into the Fiber Cutter and determine the length of the fiber to be cut.
- Press down the Fiber Cutter in a single stroke to cut the fiber.
- The cutting holes cannot be used twice. If the same hole is used twice, the cutting face of the fiber will be rough and the sensing distance will be reduced. Always use an unused hole.
- Cut a thin fiber as follows:

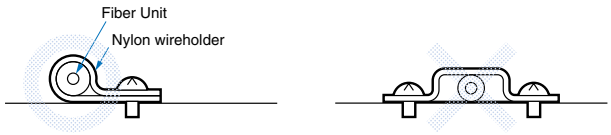
①	An attachment is temporarily fitted to a thin fiber before shipment.	
②	Secure the attachment after adjusting the position of it in the direction indicated by the arrow.	
③	Insert the fiber to be cut into the E39-F4.	
④	Finished state (proper cutting state)	 Note: Insert the fiber in the direction indicated by the arrow.

Connection

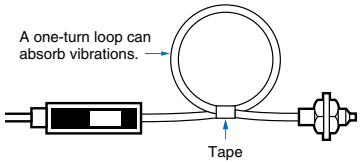
- Do not strain the fiber unit, e.g. do not apply tensile or compression force. (Within 9.8 Nm or 29.4 Nm) Use special care since the fiber is thin.
- The bending radius of the fiber unit should exceed the admissible bending radius given in "Type/standard price" and "Ratings/performance".
- Do not bend the edge of the fiber units (excluding the E32-T□R and E32-D□R).



- Do not apply excess force on the fiber units.

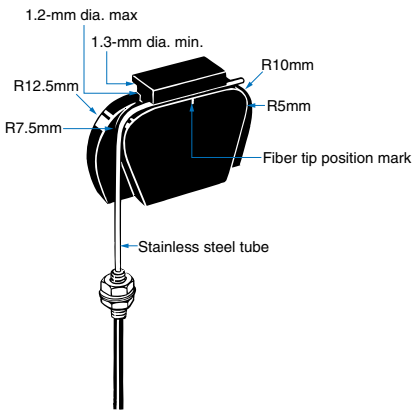


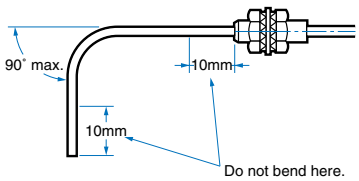
- The fiber head could be break from excessive vibration. To prevent this, the following is applied:



E39-F11 Sleeve Bender

- The bending radius of the stainless steel tube should be as large as possible. The smaller the bending radius becomes, the shorter the sensing distance will be.
- Insert the tip of the stainless steel tube to the sleeve bender and bend the stainless steel tube slowly along the curve of the sleeve bender (refer to the figure).



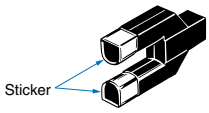


Heat-resistant fibers (E32-D51, E32-T51)

- The bending radius should be 35 mm up.
- The fiber connector E39-F10 cannot be used for extension.
- +130 max. for continuous operation at high temperature. The upper limit of the short-time operable temperature is +150

E32-T14/E32-G14

The presence of a reflective object at the front ends of the lenses may place the unit in an incident state. In this case, apply the supplied black seals to the front ends of the lenses.



Wafer sensor (E32-L25 (A))

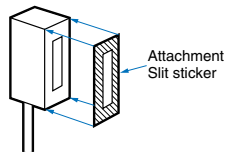
- Insert the fiber with a white line into the emission side of the amplifier.
- When installing the sensor head, tighten it to the 0.78Nm torque.
- Do not expose the sensor to water.

Supplied slit for E32-T16

When using the supplied slit, peel off the back paper and apply it along the outline of the sensing surface. For use at 45 mm or less, always fit a slit of 0.5 mm width.

Example

E32-T16 sensing head



E32-M21

Set the four fibers at a sufficient distance to avoid interfering with each other.

Adjustment

E32-G14

Because of a short sensing distance, the incident level becomes excessive, disabling "without-work teaching". Use with/without-work teaching.

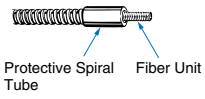
Accessories

Use of E39-R3 Reflector

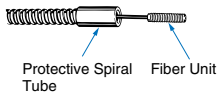
1. When using an adhesive tape on the rear face, apply it after washing off oil, dust, etc. with detergent from the place of application. The reflector cannot be installed if there remains oil, etc.
2. The E39-R3 cannot be used in places where it is exposed to oil or chemicals.

Protective Spiral Tubes

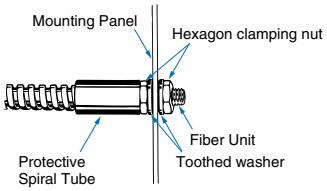
1. Insert a fiber to the protective spiral tube from the head connector side (screwed) of the tube.



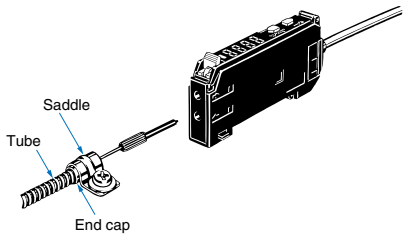
2. Push the fiber into the protective spiral tube. The tube should be straight so that the fiber is not twisted when inserted. Then turn the end cap of the spiral tube.



3. Secure the protective spiral tube at a suitable place with the attached nut.

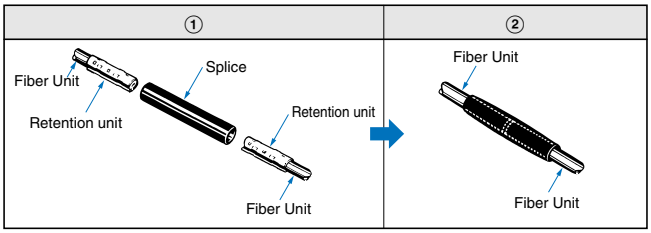


4. Use the attached saddle to secure the end cap of the protective spiral tube. To secure the protective spiral tube at a position other than the end cap, apply tape to the tube so that the portion becomes thicker in diameter.



E39-F10 Fiber Connector

Fit the connector in the following procedure.



- The fiber units should be as close as possible when they are connected. Sensing distance will be reduced by approximately 25% when fibers are connected.

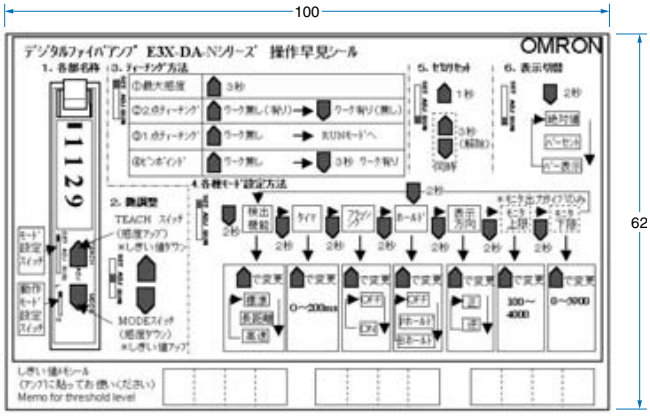
Only 2.2 mm dia. fibers can be connected.

For E3X-DA-N

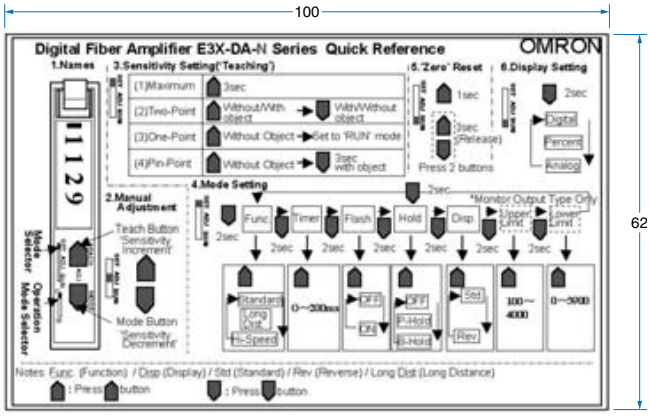
Operating Instructions Sticker E39-Y1

- Apply this seal next to the sensor.
- (1 English and 1 Japanese stickers per set)
- Material: (Front) Paper, (rear) adhesive tape

Japanese Sticker



English Sticker

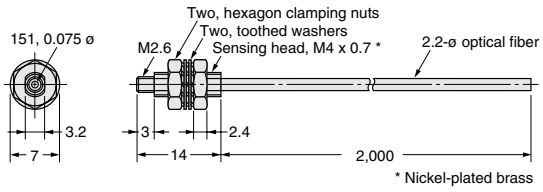


Dimensions

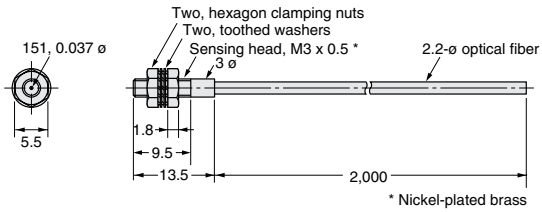
General purpose

Throughbeam

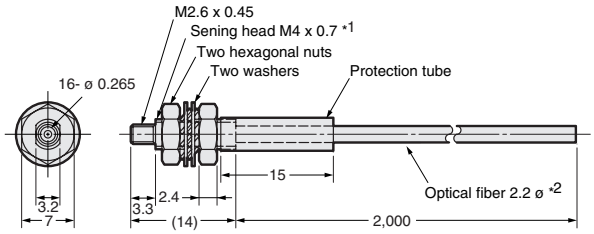
E32-ET11R



E32-ET21R

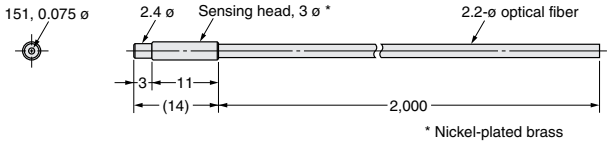


E32-T11U

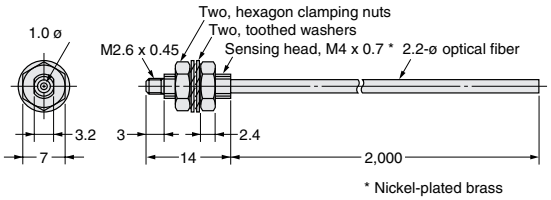


*1 Material: nickel-plated brass
*2 Sheath: flouroresin

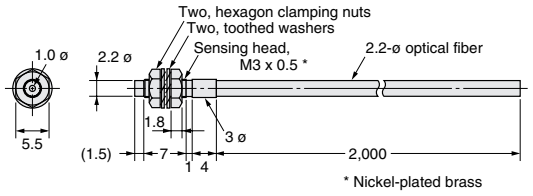
E32-T12R



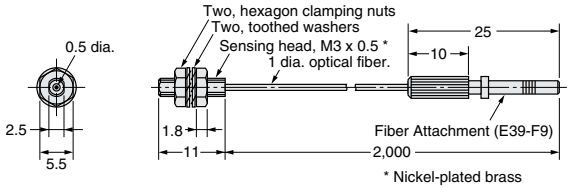
E32-TC200



E32-TC200A

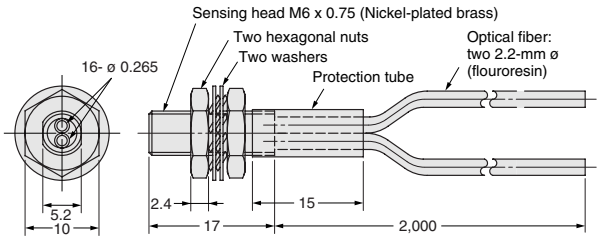


E32-TC200E



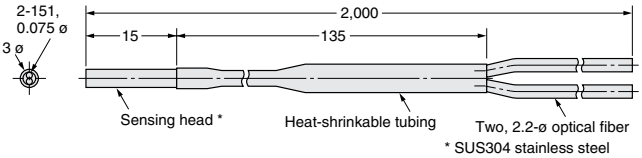
Diffuse reflective

E32-D11U

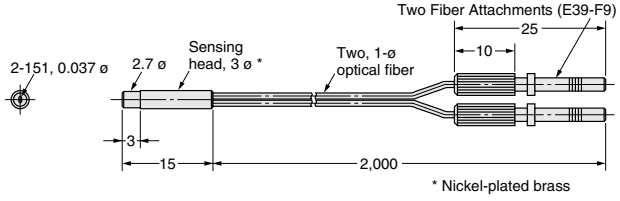


*1. material: nickel plated brass
*2. outside: kind of fluorine resin

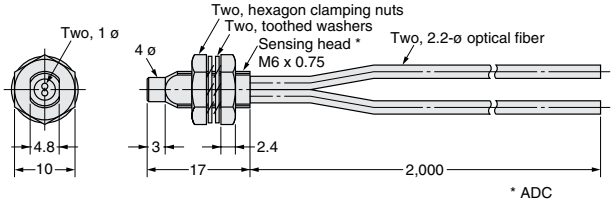
E32-D12R



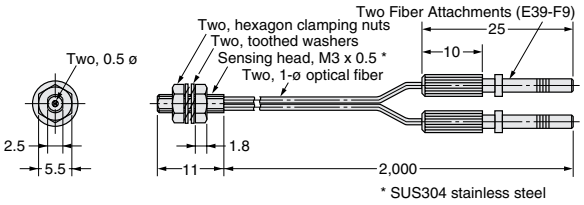
E32-D22R



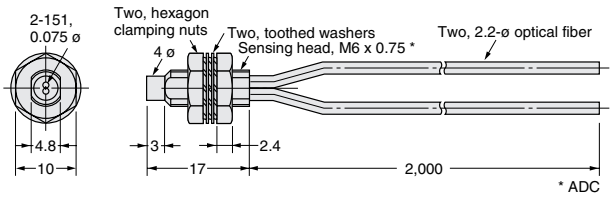
E32-DC200



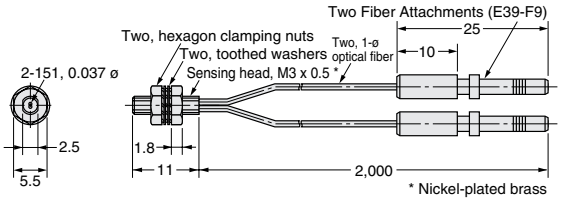
E32-DC200E



E32-ED11R



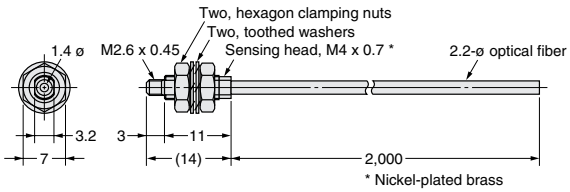
E32-ED21R



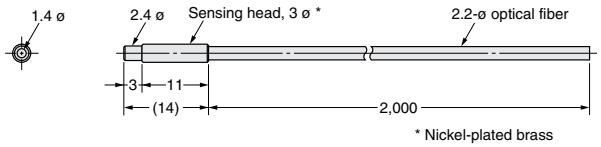
Long Distance

Throughbeam

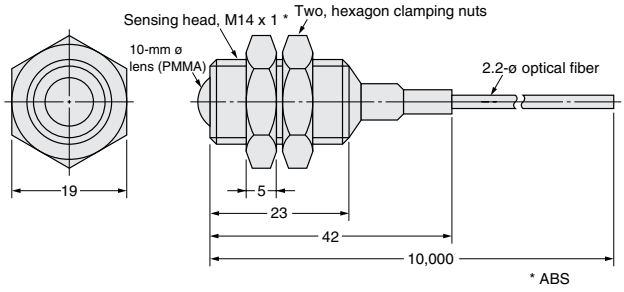
E32-T11L



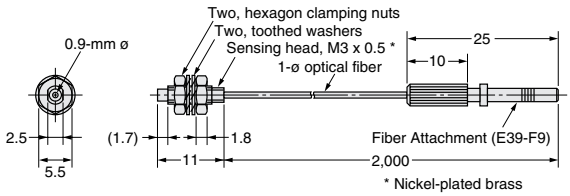
E32-T12L



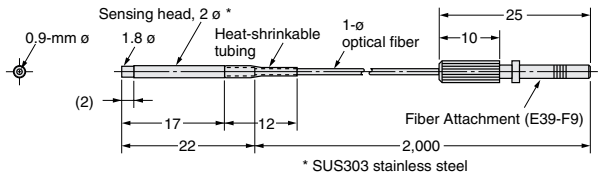
E32-T17L



E32-T21L

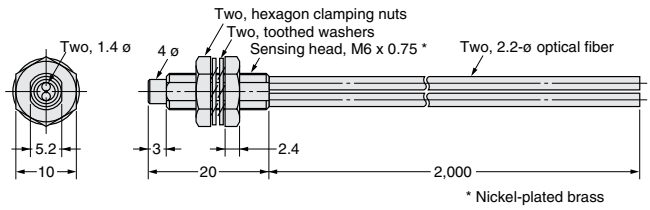


E32-T22L

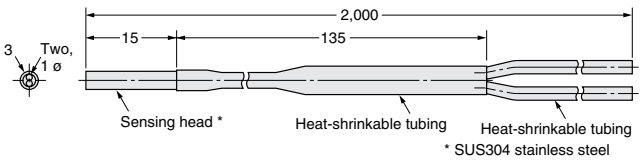


Diffuse reflective

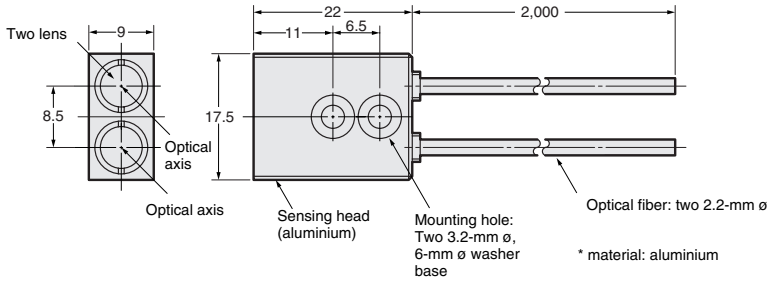
E32-D11L



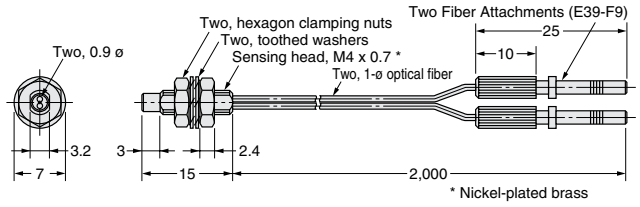
E32-D12



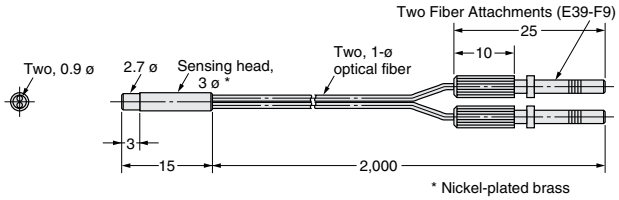
E32-D16



E32-D21L



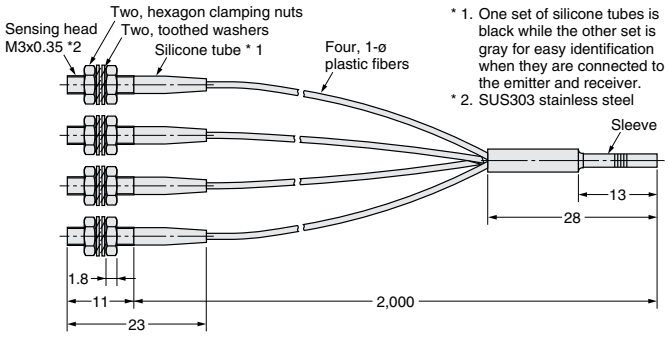
E32-D22L



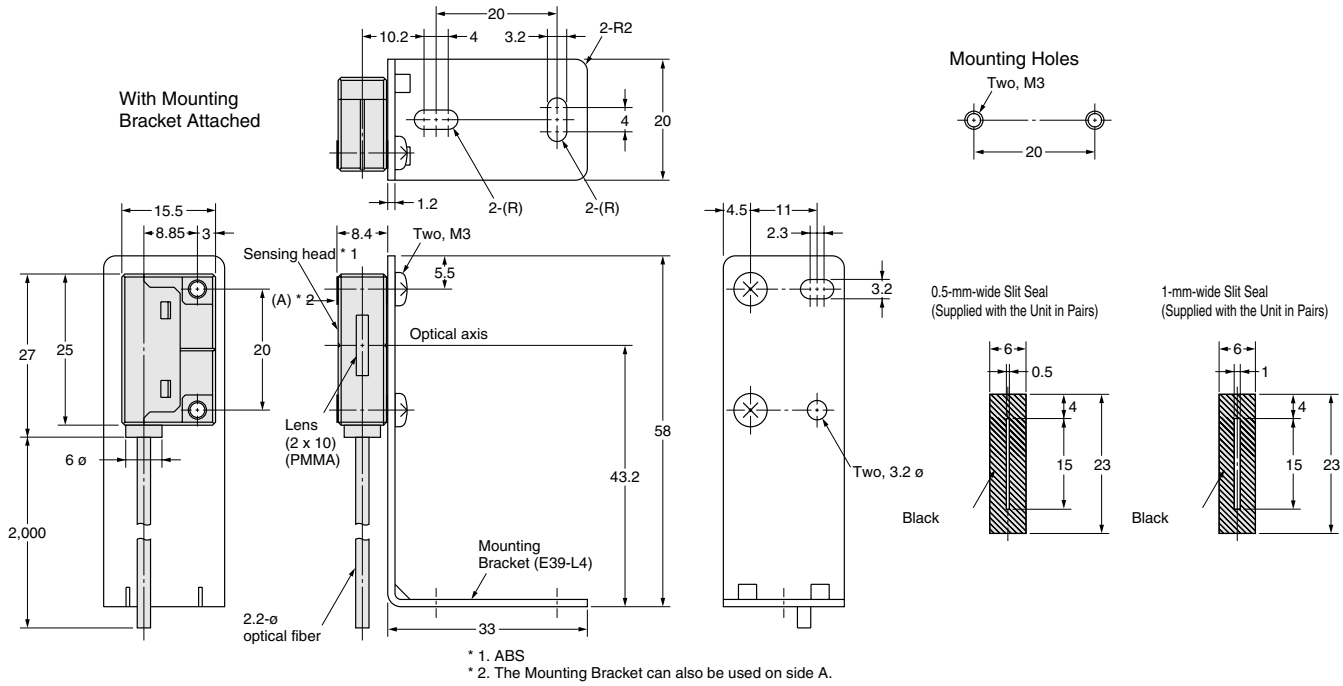
Area sensing

Throughbeam

E32-M21

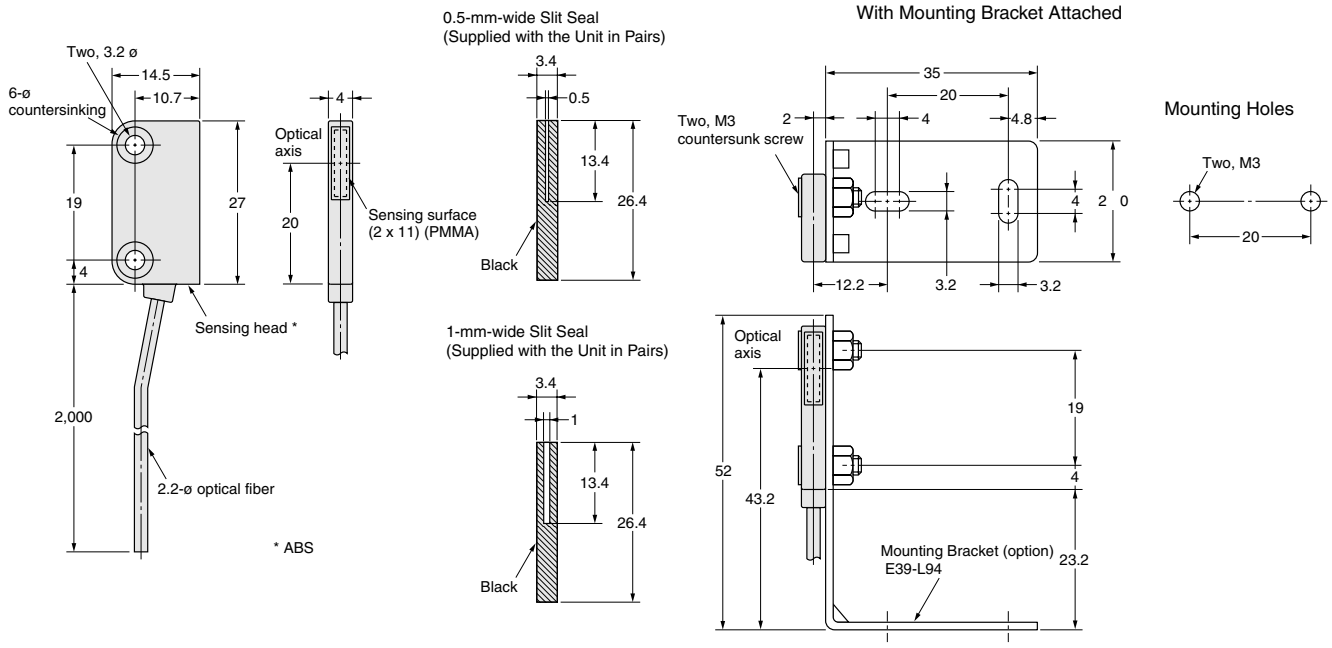


E32-T16

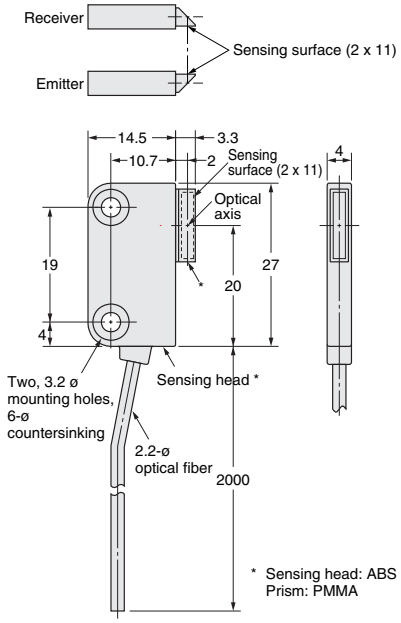


* 1. ABS
* 2. The Mounting Bracket can also be used on side A.

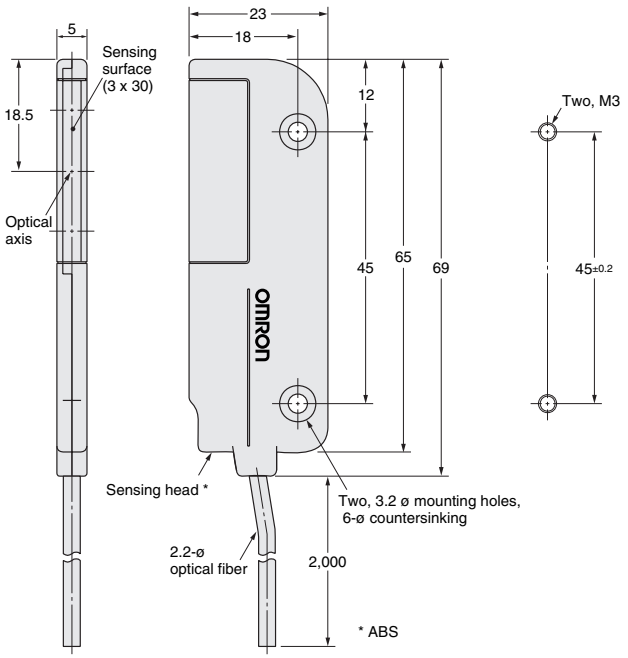
E32_T16P
E32_T16PR



E32-T16
E32-T16JR

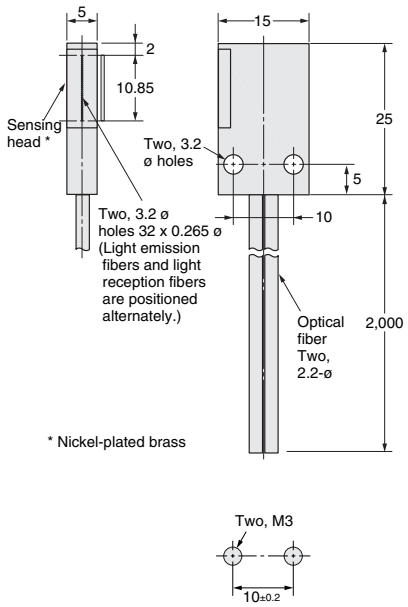


E32-T16W
E32-T16WR



Diffuse reflective

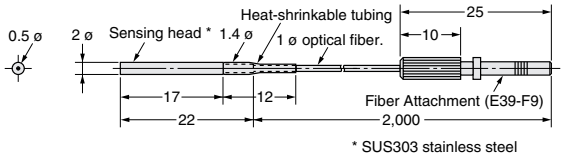
E32-D36P1



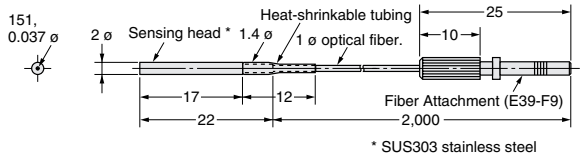
Small fiber head

Throughbeam

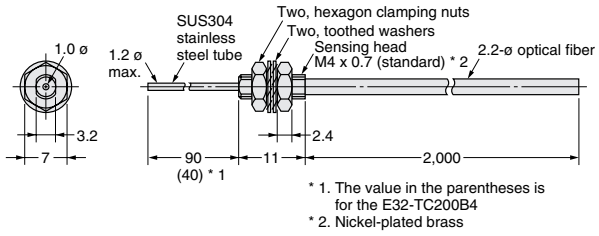
E32-T22



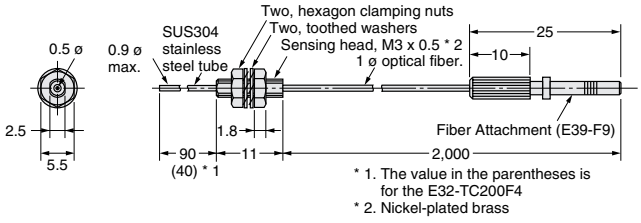
E32-T22R



E32-TC200B
E32-TC200B4

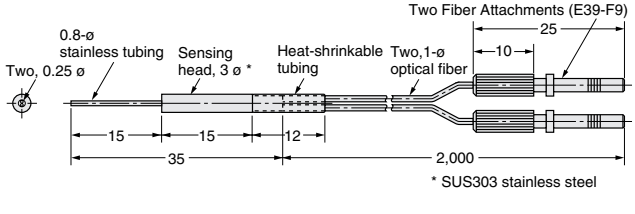


E32-TC200F
E32-TC200F4

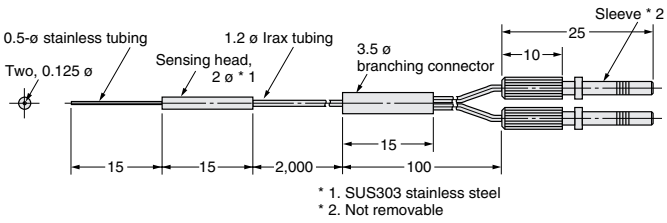


Diffuse reflective

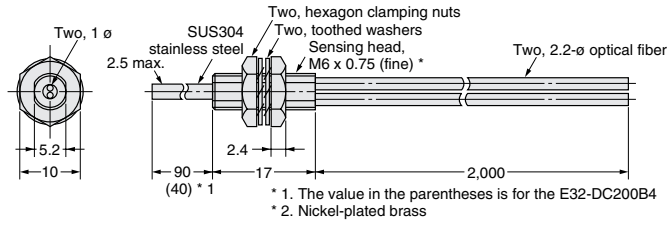
E32-D33



E32-D331

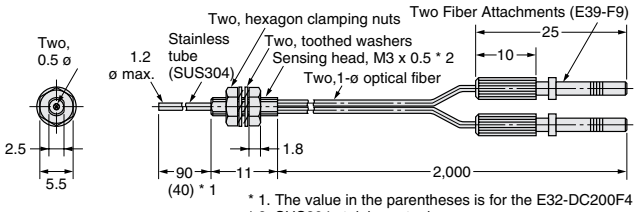


E32-DC200B
E32-DC200B4



* 1. The value in the parentheses is for the E32-DC200B4
* 2. Nickel-plated brass

E32-DC200F
E32-DC200F4

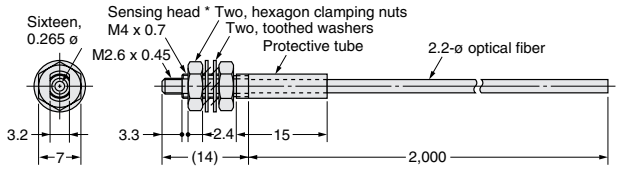


* 1. The value in the parentheses is for the E32-DC200F4
* 2. SUS304 stainless steel

Fiber for Robot Application R4

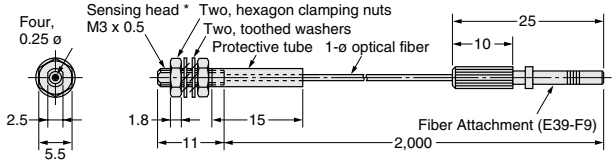
Throughbeam

E32-T11



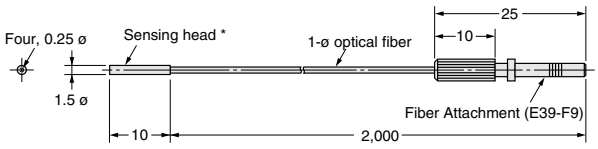
* Nickel-plated brass

E32-T21



* Nickel-plated brass

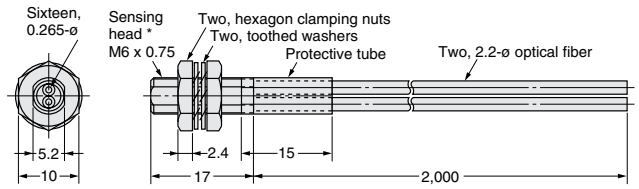
E32-T22B



* Nickel-plated brass

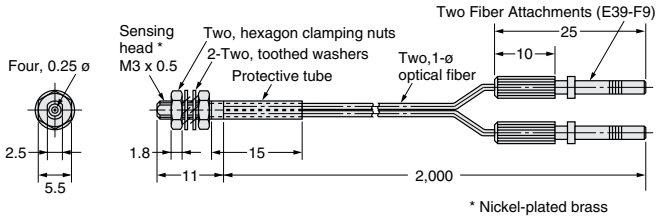
Diffuse reflective

E32-D11



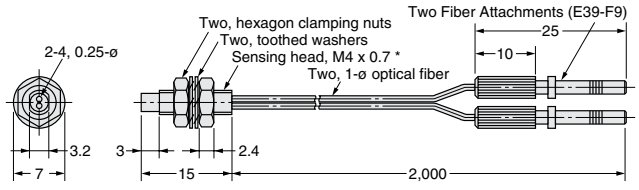
* Nickel-plated brass

E32-D21



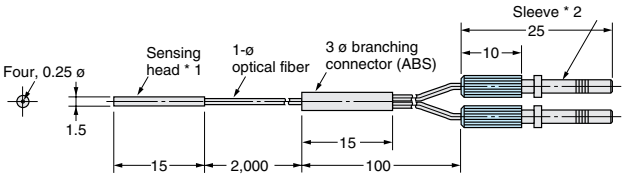
* Nickel-plated brass

E32-D21B



* SUS303 stainless steel

E32-D22B

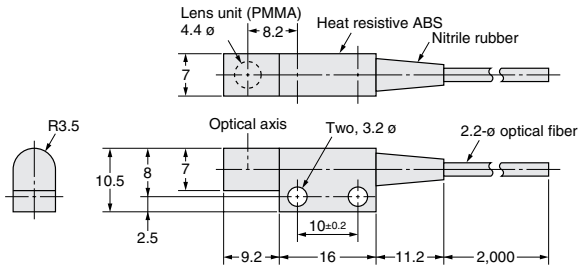


* 1. SUS304 stainless steel
* 2. Not removable

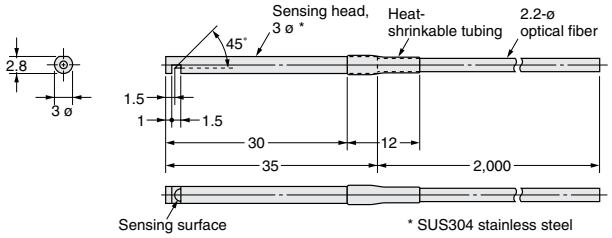
Side view

Throughbeam

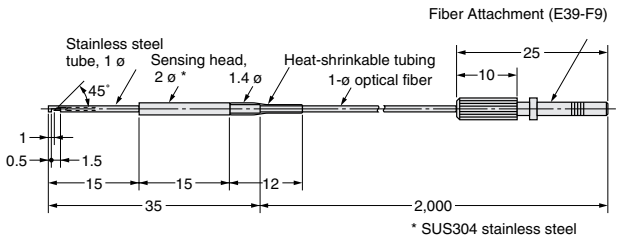
E32-T14



E32-T14L
E32-T14LR

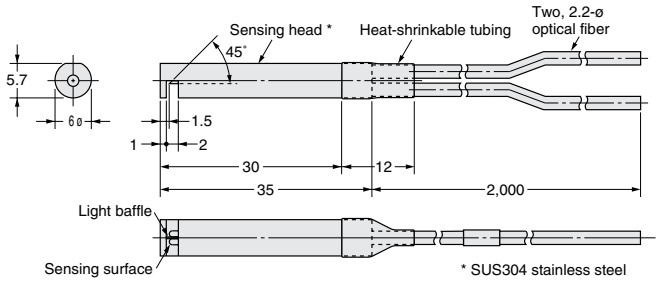


E32-T24
E32-T24R

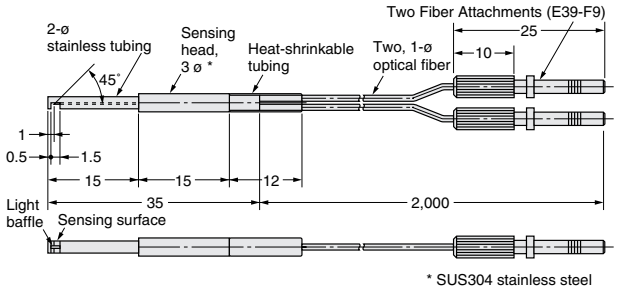


Diffuse reflective

E32-D14L
E32-D14LR



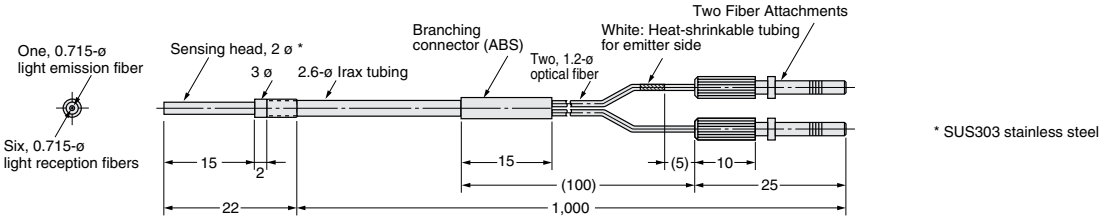
E32-D24
E32-D24R



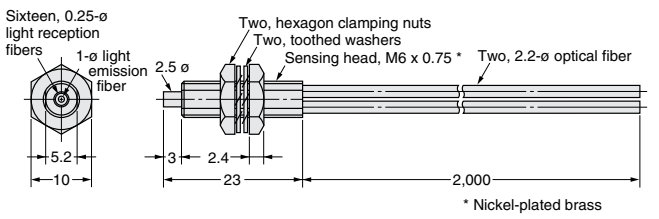
Coaxial fiber

Diffuse reflective

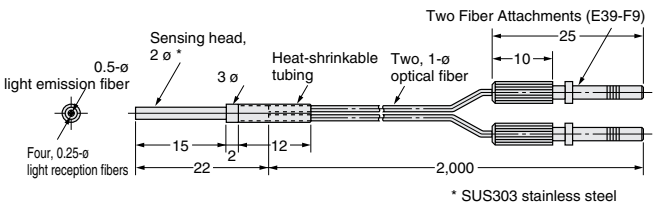
E32-C42



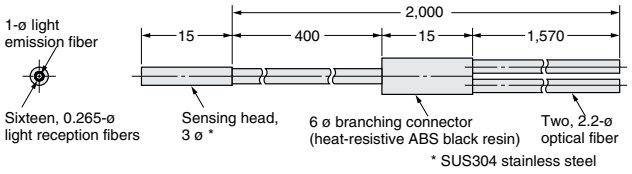
E32-CC200



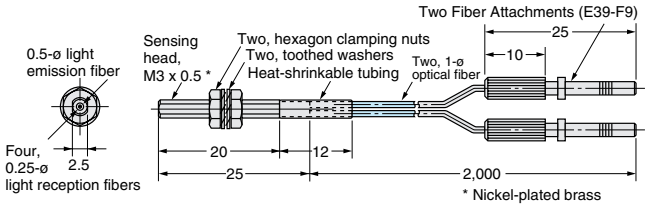
E32-D32



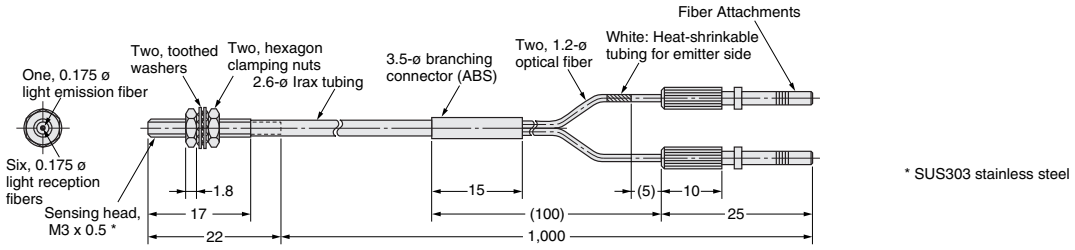
E32-D32L



E32-EC31



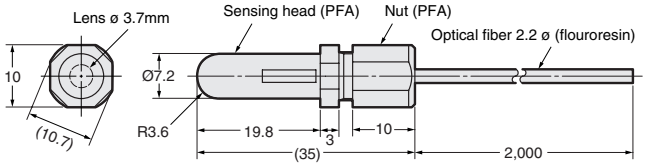
E32-EC41



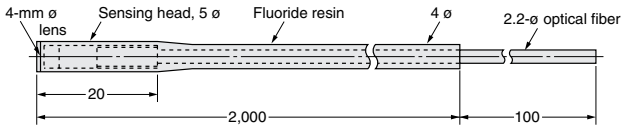
Chemical resistant

Throughbeam

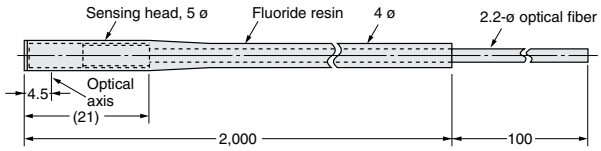
E32-T11F



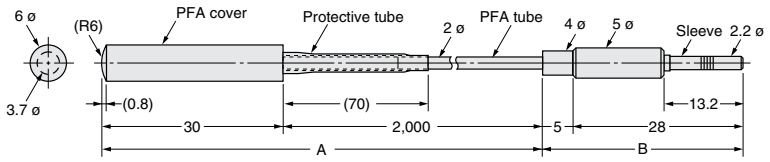
E32-T12F



E32-T14F

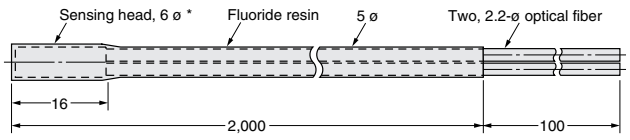


E32-T81F-S



Diffuse reflective

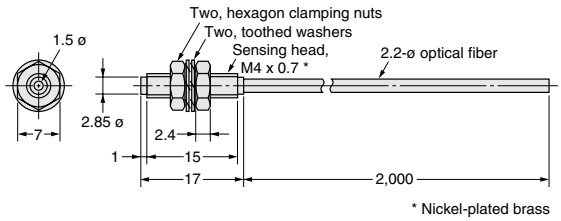
E32-D12F



Heat resistant

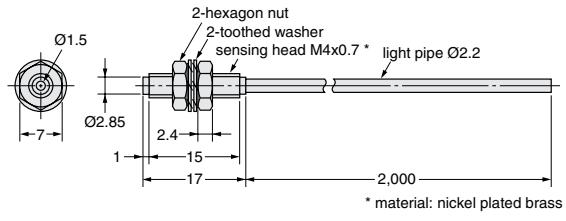
Throughbeam

E32-ET51



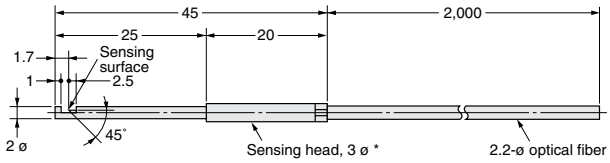
* Nickel-plated brass

E32-T51



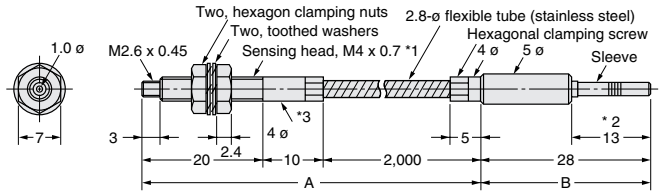
* material: nickel plated brass

E32-T54



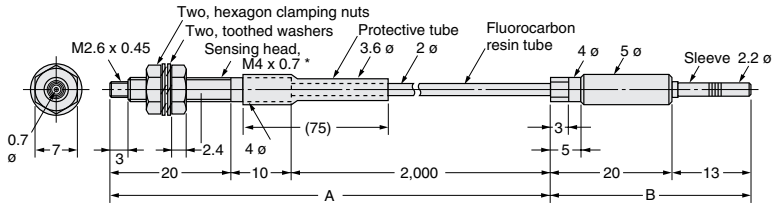
* SUS303 stainless steel

E32-T61-S



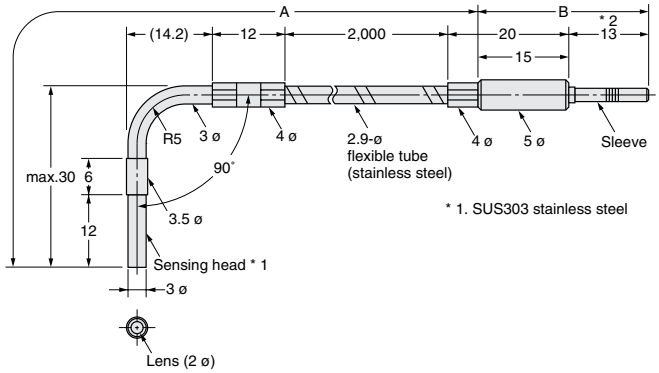
* 1. SUS303 stainless steel
* 3. Fiber length 10 m and more

E32-T81R-S



* SUS303 stainless steel

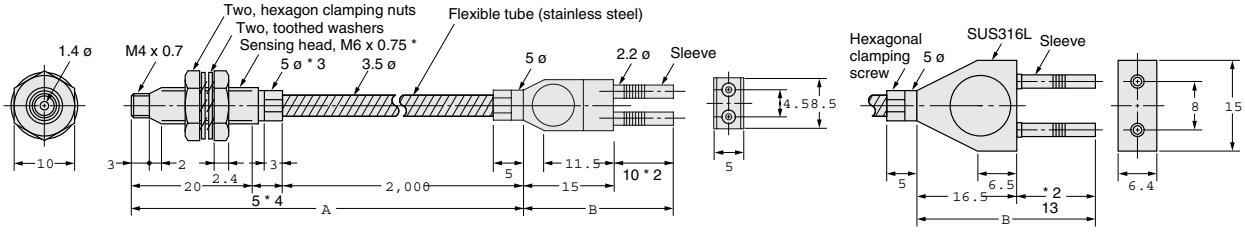
E32-T84S-S



* 1. SUS303 stainless steel

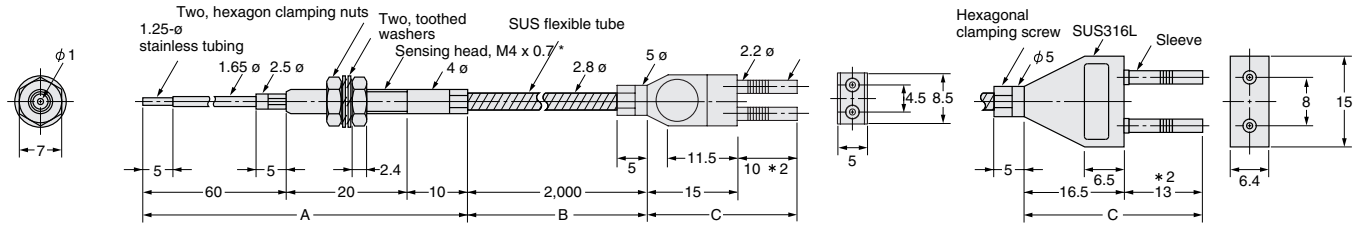
Diffuse reflective

E32-D61
E32-D61-S



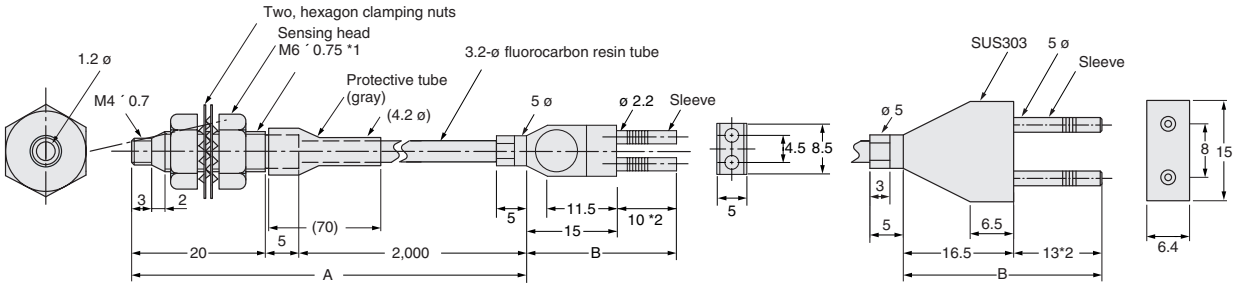
* 1. SUS303 stainless steel
* 3. Fiber length 10 m and more becomes 6-diameter.
* 4. Fiber length 10 m and more becomes 10-diameter.

E32-D73
E32-D73-S



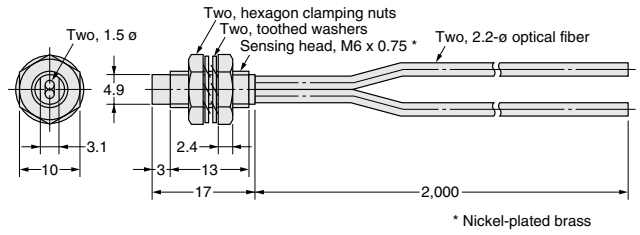
* 1. SUS303 stainless steel

E32-D81R
E32-D81R-S



* 1. SUS303 stainless steel

E32-ED51

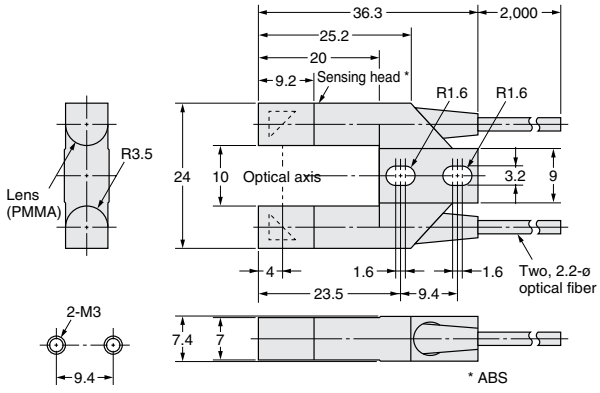


* Nickel-plated brass

Grooved

Throughbeam

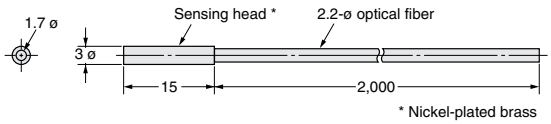
E32-G14



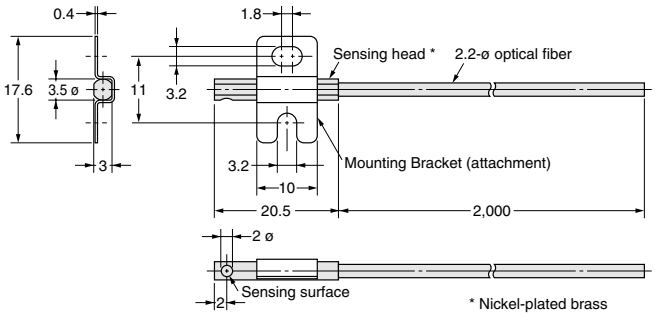
Narrow Vision Field

Throughbeam

E32-T22S



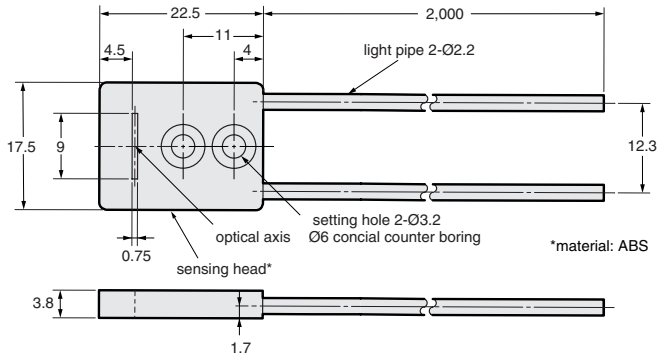
E32-T24S



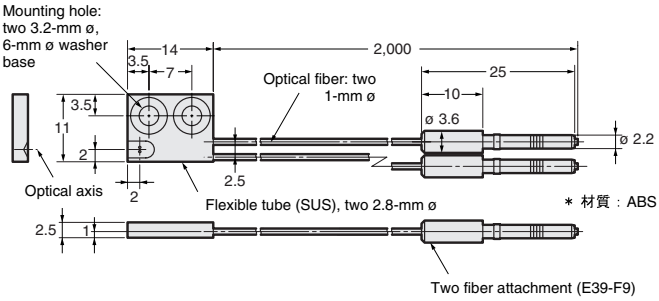
Limited-reflective

Diffuse reflective

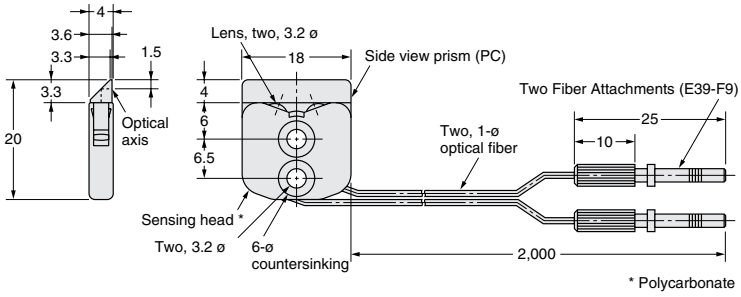
E32-L16



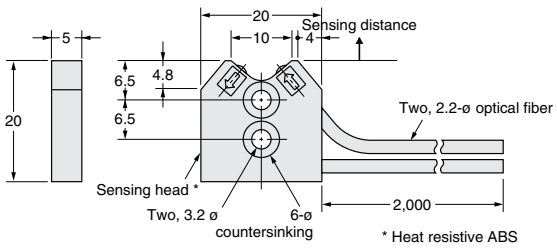
E32-L24S



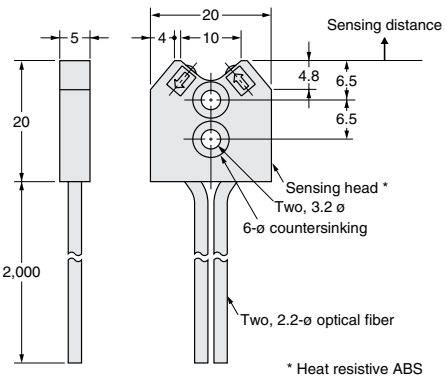
E32-L24L



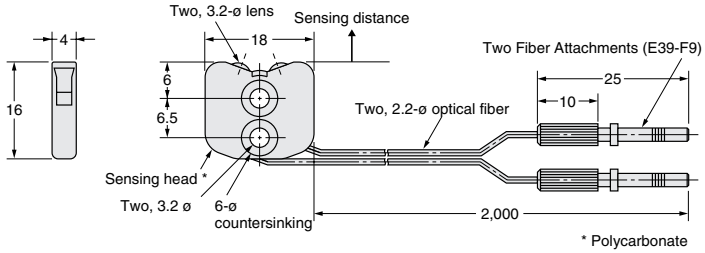
E32-L25



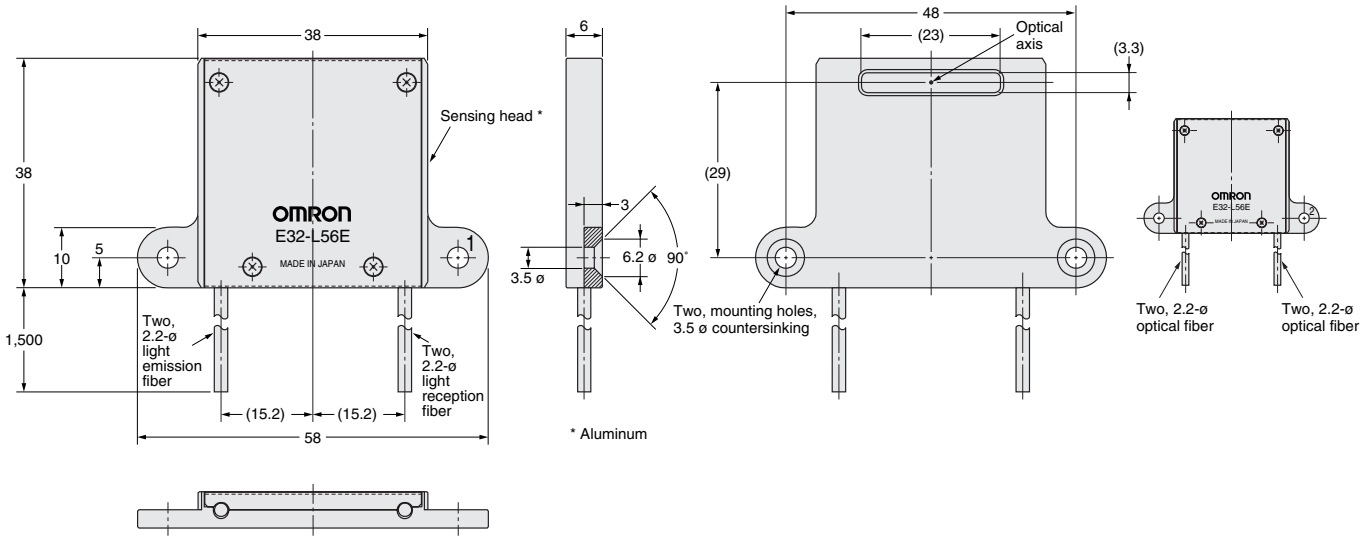
E32-L25A



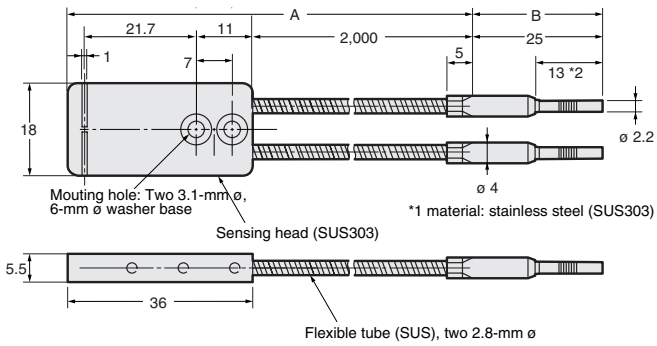
E32-L25L



E32-L56E1
E32-L56E2



E32-L66

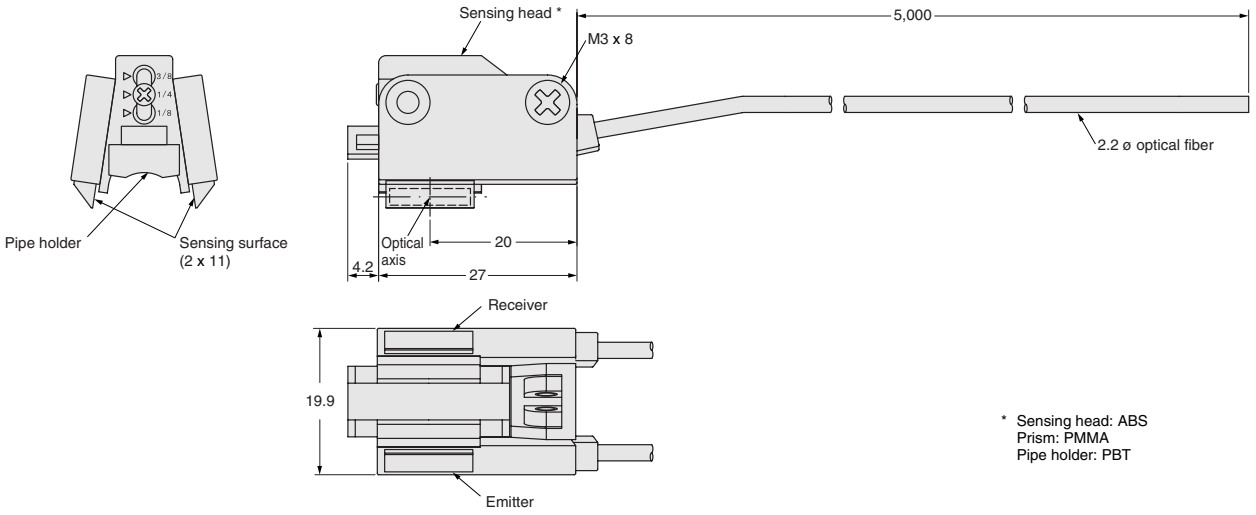


Note: Ambient temperature of A part is 300 degree C and of B part is 110 degree C. When the part indicated by *2 is inserted into amplifier, ambient temperature of *2 part is the same as that of amplifier unit.

Fluid-level Detection Fiber Units

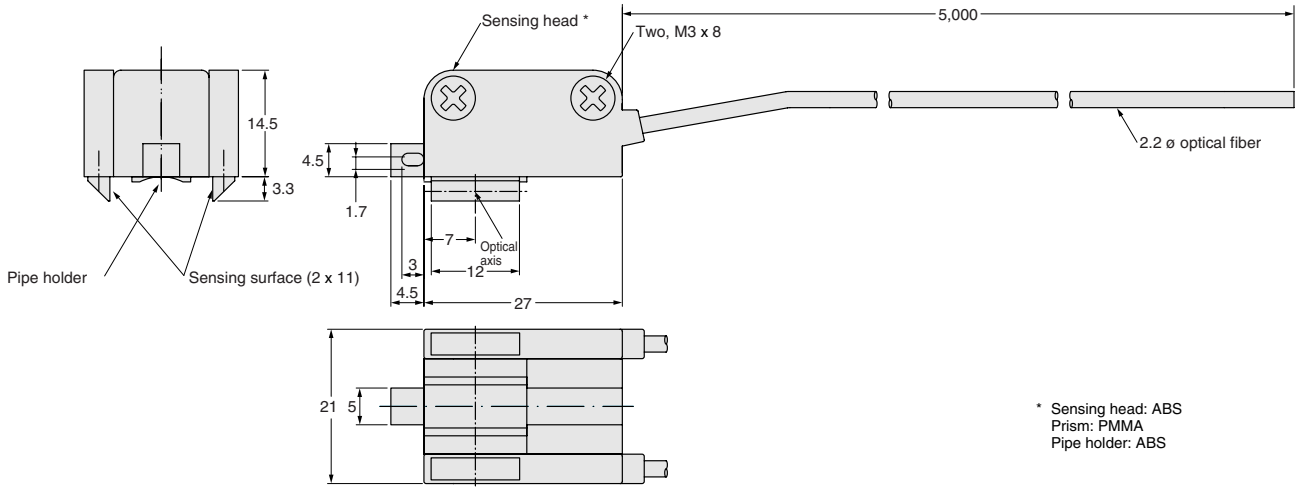
Diffuse reflective

E32-A01



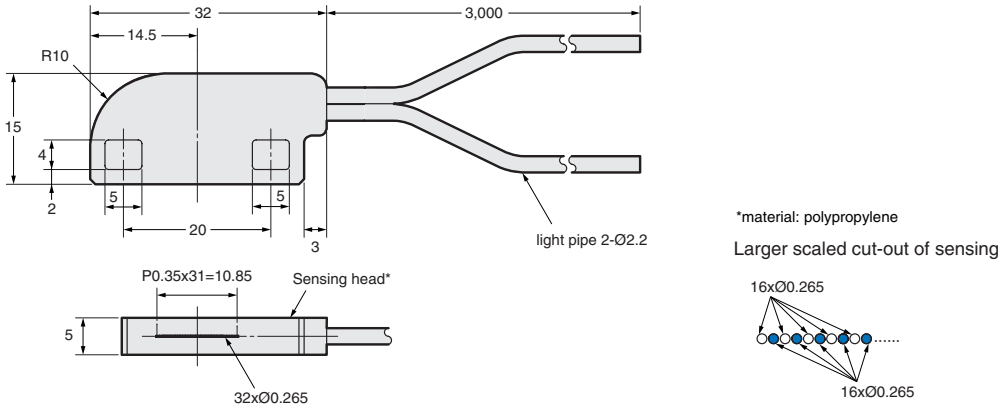
* Sensing head: ABS
Prism: PMMA
Pipe holder: PBT

E32-A02



* Sensing head: ABS
Prism: PMMA
Pipe holder: ABS

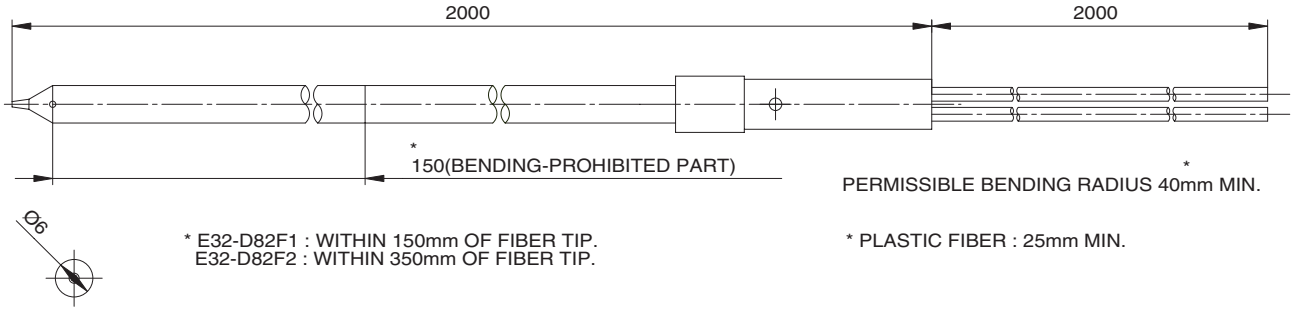
E32-D36F



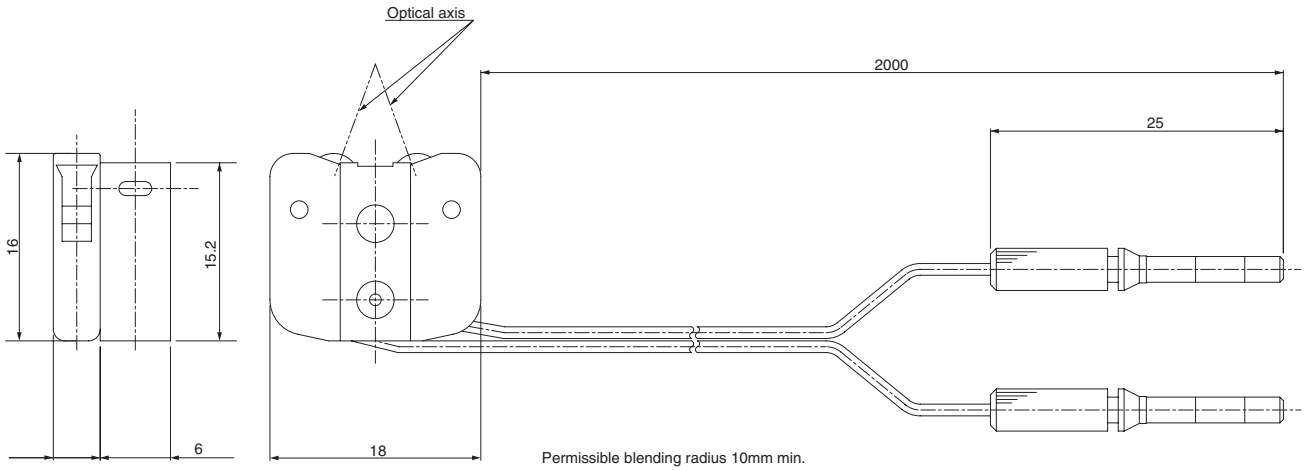
*material: polypropylene

Larger scaled cut-out of sensing

E32-D82F1
E32-D82F2



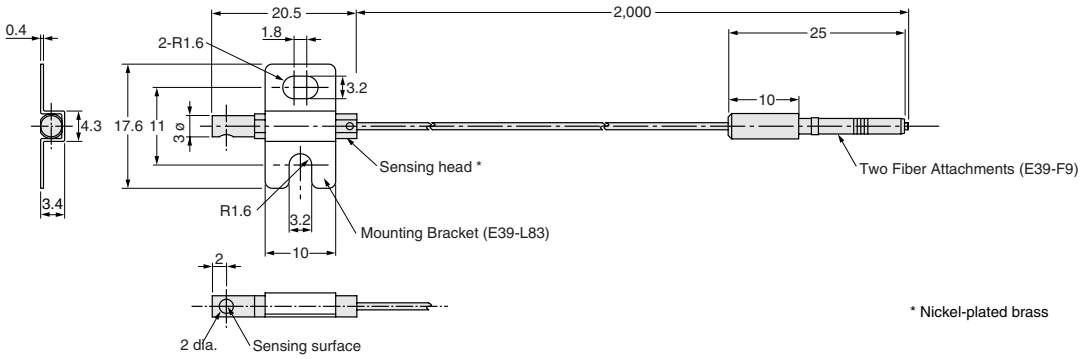
E32-L25T



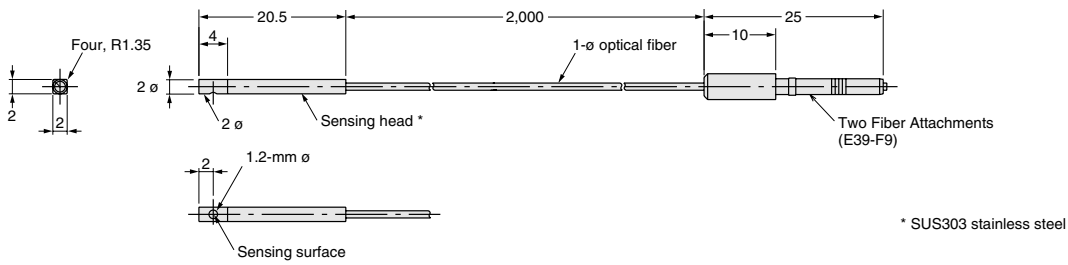
Mapping sensors

Diffuse reflective

E32-A03

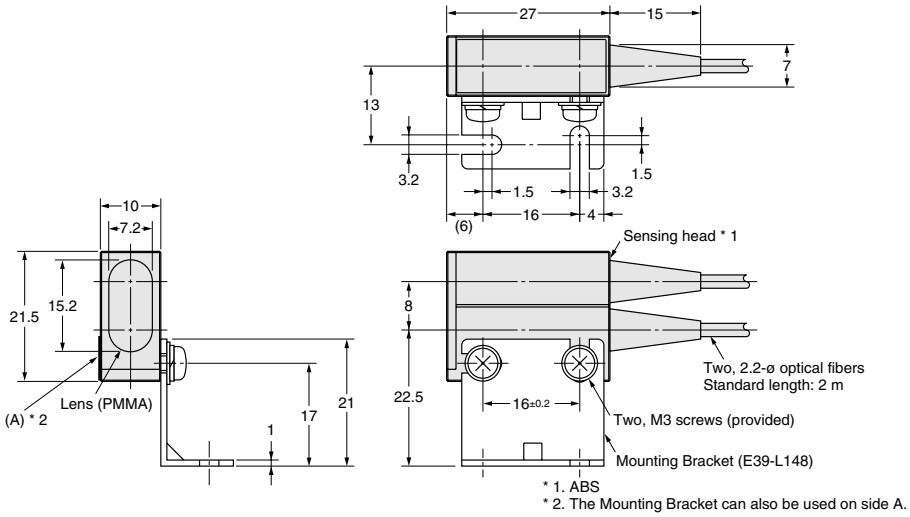


E32-A04

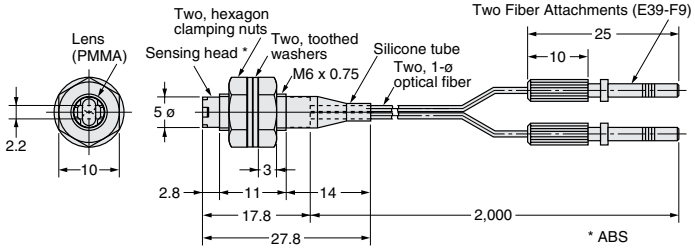


Retroreflective

E32-R16



E32-R21



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E21E-EN-01

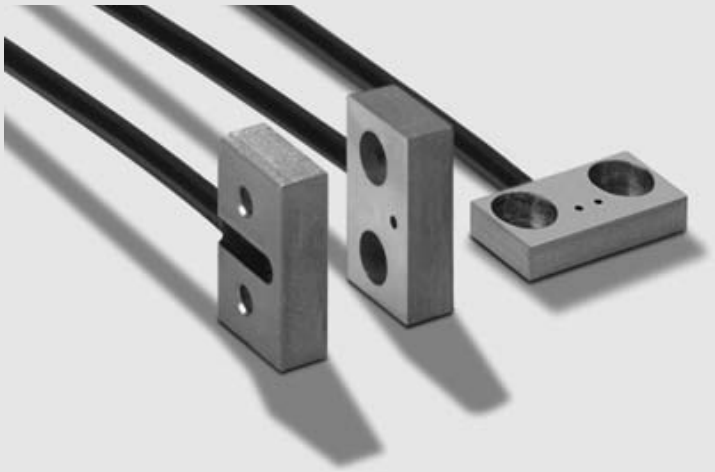
In the interest of product improvement, specifications are subject to change without notice.

Fiber Unit

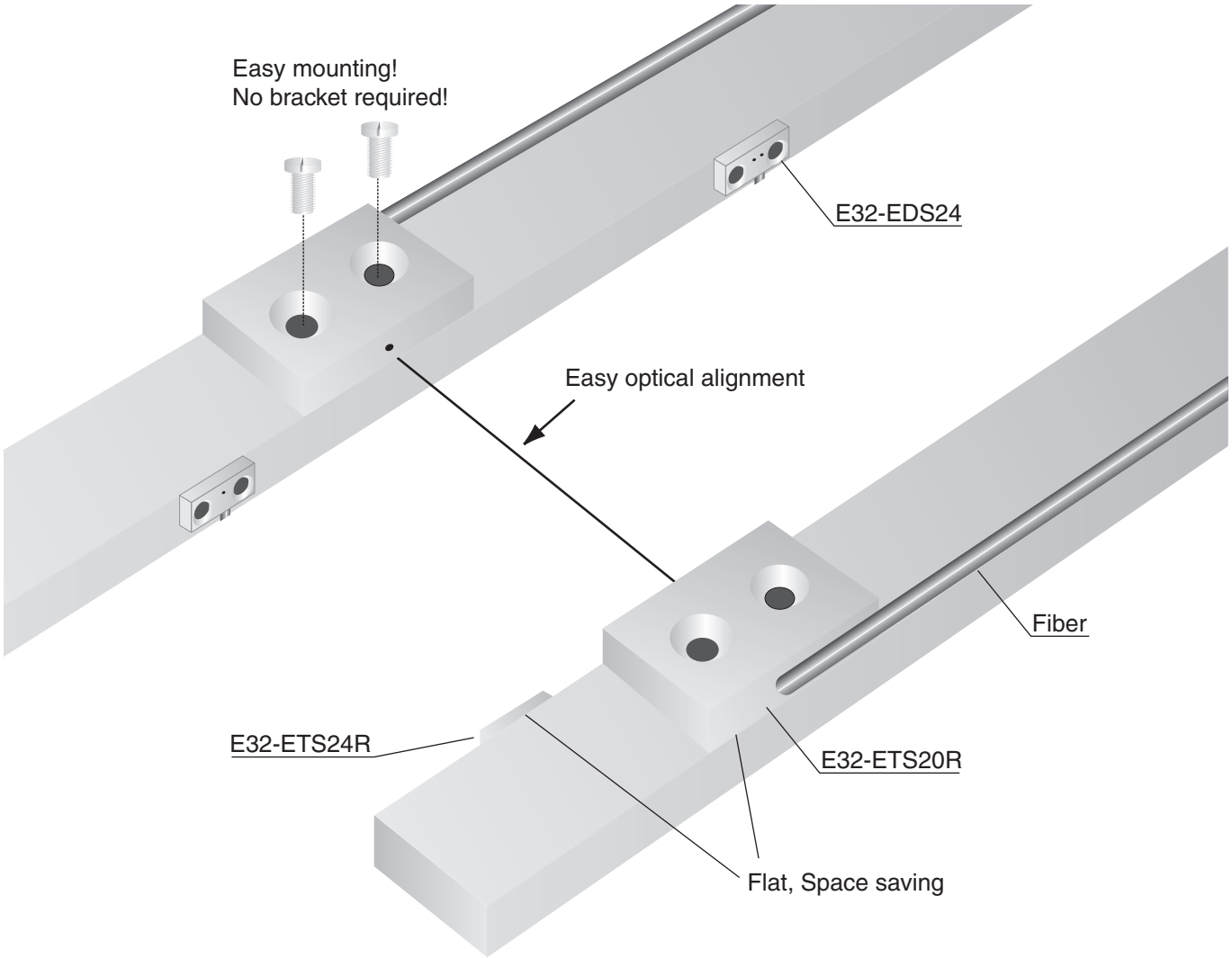
E32-ETS / EDS Series

Flat square shape for easy mounting

- Flat and space saving shape fits in narrow spaces
- Easy mounting and optical axis alignment
- No mounting bracket necessary, just fixing it with two screws
- Flexible fibers with 1 mm bending radius
- Strong Aluminium housing for rough ambient conditions

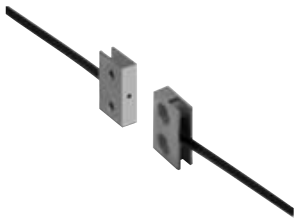
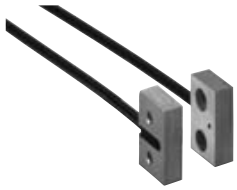
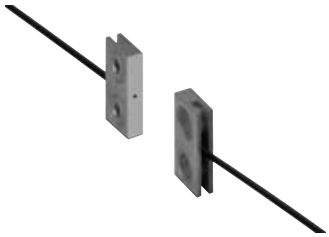
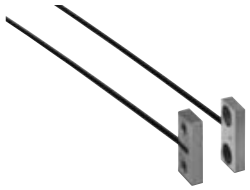
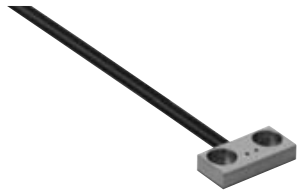


Application



Ordering Information

Sensors

Sensor Type	Product Code	Shape
Through Beam	E32-ETS10R 2M	
Through Beam, Side View	E32-ETS14R 2M	
Through Beam	E32-ETS20R 2M	
Through Beam, Side View	E32-ETS24R 2M	
Diffuse Reflection, Side View	E32-EDS24R 2M	

Amplifier Overview

Digital Amplifier

Amplifier Units

Amplifier Units with Cables

Item		Appearance	Functions	Model	
				NPN output	PNP output
Standard models			---	E3X-DA11-S	E3X-DA41-S
Mark-detecting models	Green LED		---	E3X-DAG11-S	E3X-DAG41-S
	Blue LED		---	E3X-DAB11-S	E3X-DAB41-S
Advanced models	Twin-output models		Area output, self-diagnosis, differential operation	E3X-DA11TW-S	E3X-DA41TW-S
	External-input models		Remote setting, counter, differential operation	E3X-DA11RM-S	E3X-DA41RM-S

Amplifier Units with Connectors

Item		Appearance	Functions	Model	
				NPN output	PNP output
Standard models			---	E3X-DA6-S	E3X-DA8-S
Mark-detecting models	Green LED		---	E3X-DAG6-S	E3X-DAG8-S
	Blue LED		---	E3X-DAB6-S	E3X-DAB8-S
Advanced models	Twin-output models		Area output, self-diagnosis, differential operation	E3X-DA6TW-S	E3X-DA8TW-S
	External-input models		Remote setting, counter, differential operation	E3X-DA6RM-S	E3X-DA8RM-S

Dual Channel Amplifier

Amplifier Units

Amplifier Units with Cables

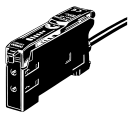
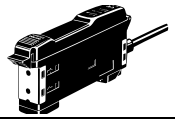
Item	Appearance	Functions	Model	
			NPN output	PNP output
2-channel models		AND/OR output	E3X-MDA11	E3X-MDA41

Amplifier Units with Connectors

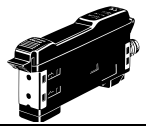
Item	Appearance	Functions	Model	
			NPN output	PNP output
2-channel models		AND/OR output	E3X-MDA6	E3X-MDA8

Manual Amplifier

Amplifier Units with Cables

Item	Shape	Control output	Model	
			NPN output	PNP output
Standard models		ON/OFF output	E3X-NA11	E3X-NA41
High-speed detection			E3X-NA11F	E3X-NA41F
Mark-detecting models			E3X-NAG11	E3X-NAG41
Water-resistant models			E3X-NA11V	E3X-NA41V

Anplifier Units with Connectors

Item	Shape	Applicable Connector (order separately)		Control output	Model	
					NPN output	PNP output
Standard models		Master	E3X-CN11	ON/OFF output	E3X-NA6	E3X-NA8
		Slave	E3X-CN12			
Water-resistant models (M8 Connector)		XS3F-M421-40□-A XS3F-M422-40□-A			E3X-NA14V	E3X-NA44V

Performance

Sensing Distance

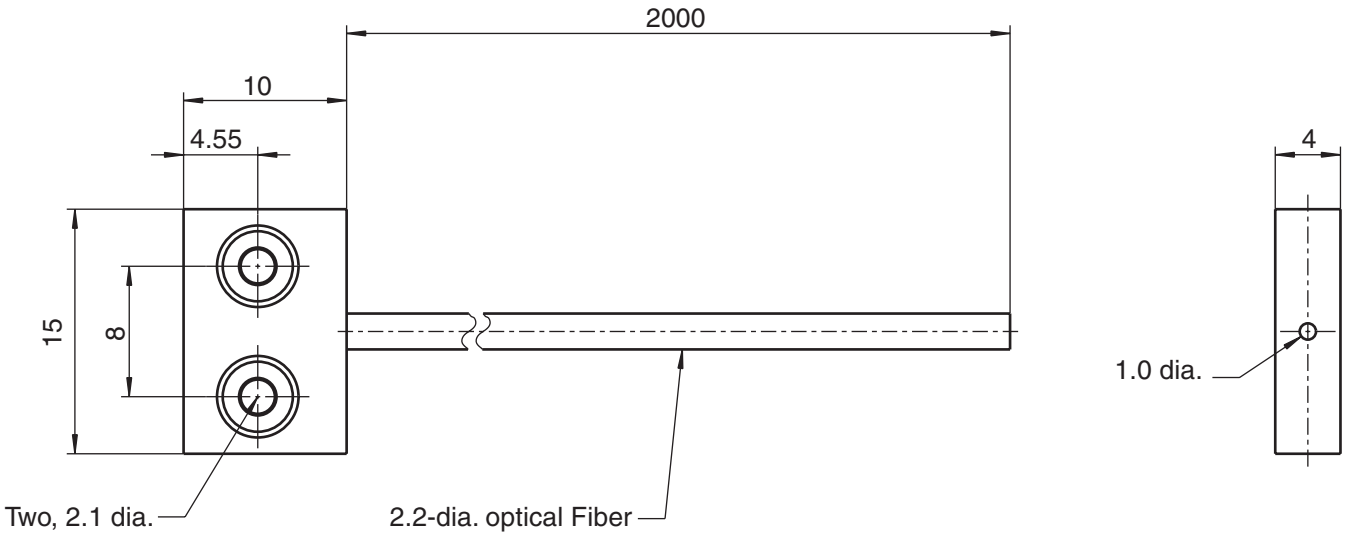
Amplifier	Mode	E32-ETS10R 2m	E32-ETS14R 2M	E32-ETS20R 2M	E32-ETS24R 2M	E32-EDS24R 2M
E3X-DA-N	Super long distance mode	700 mm	580 mm	150 mm	130 mm	45 mm
	Standard mode	560 mm	460 mm	120 mm	110 mm	35 mm
	Super high speed mode	200 mm	170 mm	40 mm	40 mm	10 mm
	Super long distance mode	480 mm	430 mm	160 mm	160 mm	70 mm
E3X-MDA	Standard mode	370 mm	330 mm	120 mm	120 mm	50 mm
	Super high speed mode	140 mm	130 mm	50 mm	50 mm	20 mm
	Super long distance mode	720 mm	630 mm	250 mm	240 mm	100 mm
E3X-DA-S	Standard mode	560 mm	480 mm	190 mm	180 mm	60 mm
	Super high speed mode	140 mm	125 mm	50 mm	45 mm	20 mm
E3X-NA41	Standard mode	420 mm	280 mm	100 mm	50 mm	17 mm
E3X-NAG41	Standard mode	100 mm	80 mm	25 mm	10 mm	2 mm
E3X-NA41F	Standard mode	140 mm	100 mm	30 mm	15 mm	4 mm

Specifications

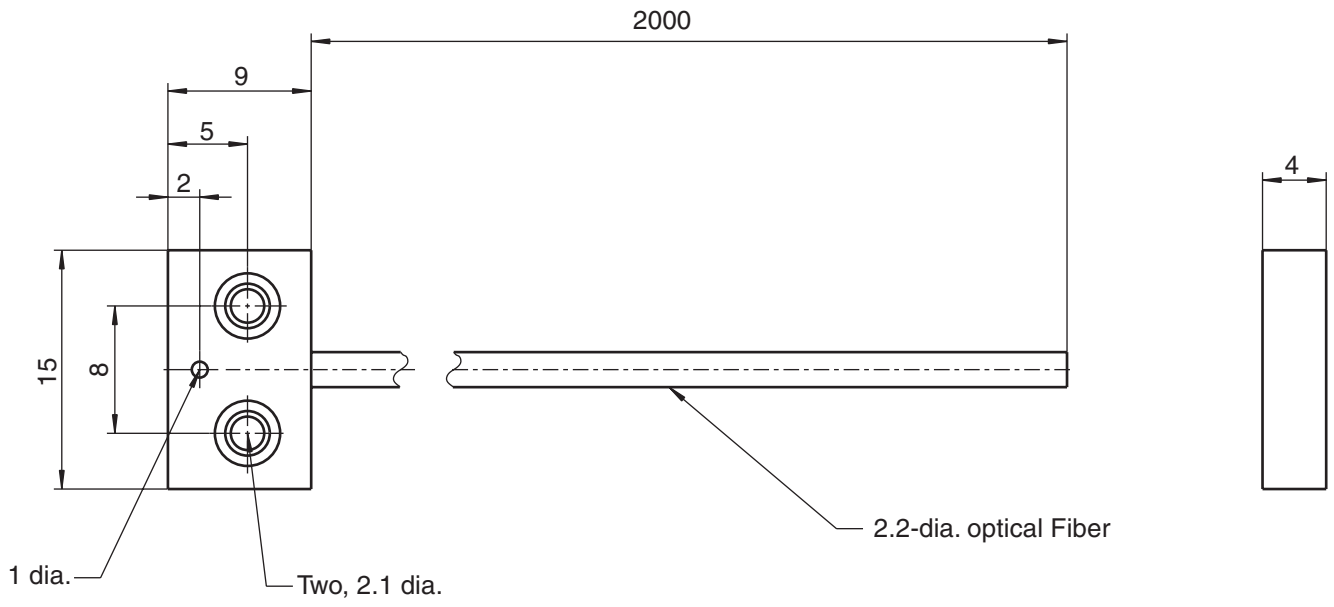
Item \ Type / Application / Model / Operation Storage	Aluminium Square Shape				
	Through beam types				Reflective type
	E32-ETS10R	E32-ETS14R	E32-ETS20R	E32-ETS24R	E32-EDS24R
Ambient temperature	- 40°C to 70°C with no icing or condensation				
Ambient humidity	Operating: 35% to 95% RH, Storage: 35% to 95% with no icing or condensation				
Permission bending radius	1 mm				
Fiber sheat material	Black Polyehylene (PE)				
Fiber core	Acrylic resin (PMMA)				
Fiber diameter	2.2 mm	2.2 mm	1 mm	1 mm	1 mm
Protective structure	IEC 60529 IP 67				
Material sensorhead	Aluminium (AL)				

Dimensions

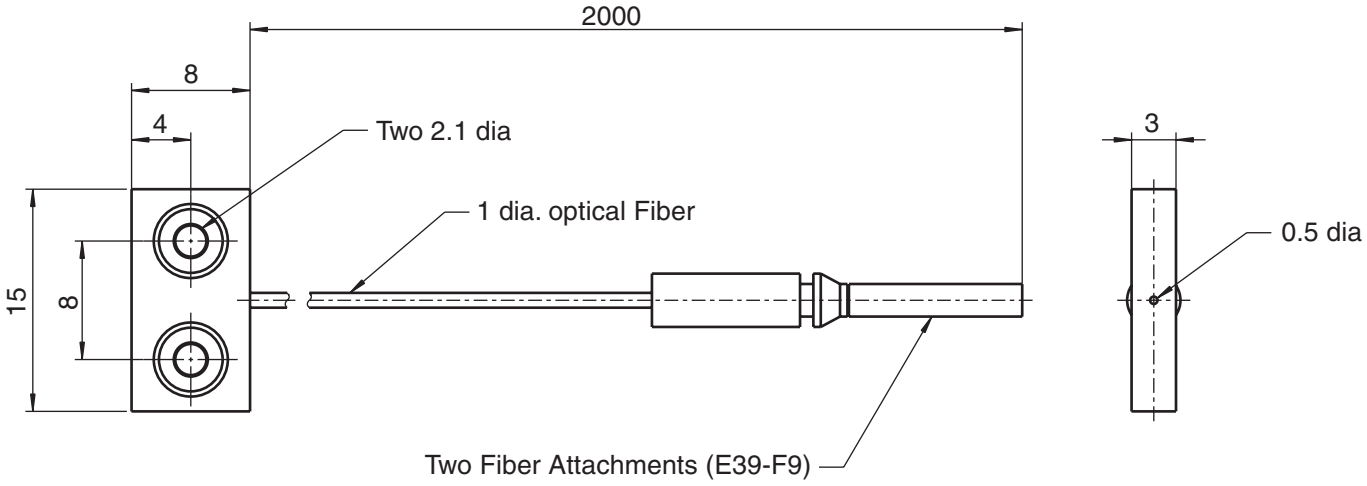
E32-ETS10R



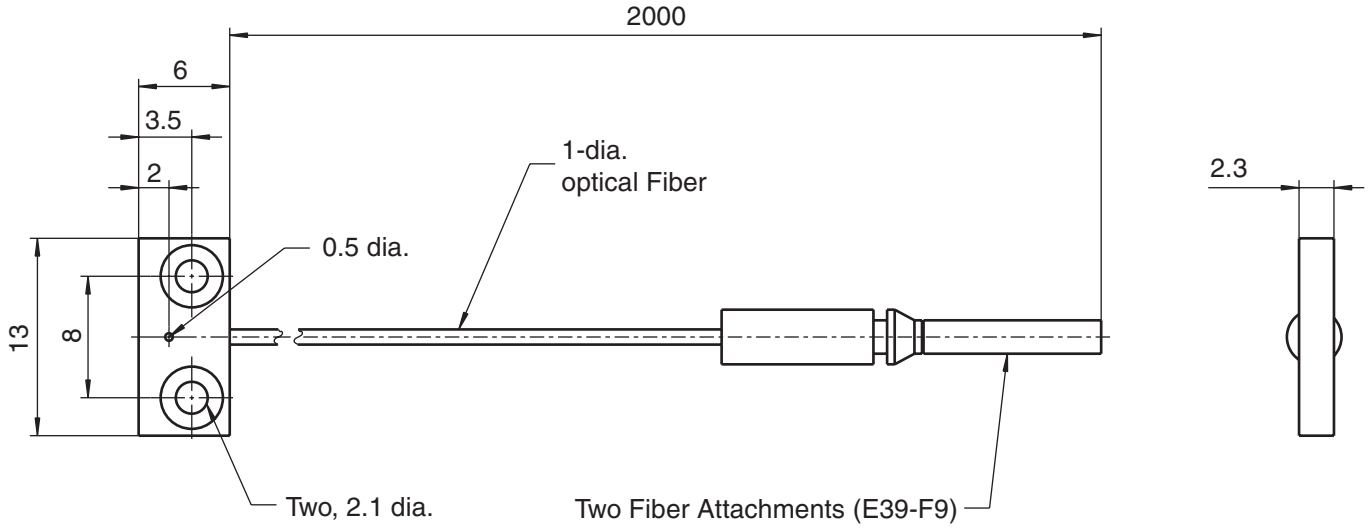
E32-ETS14R



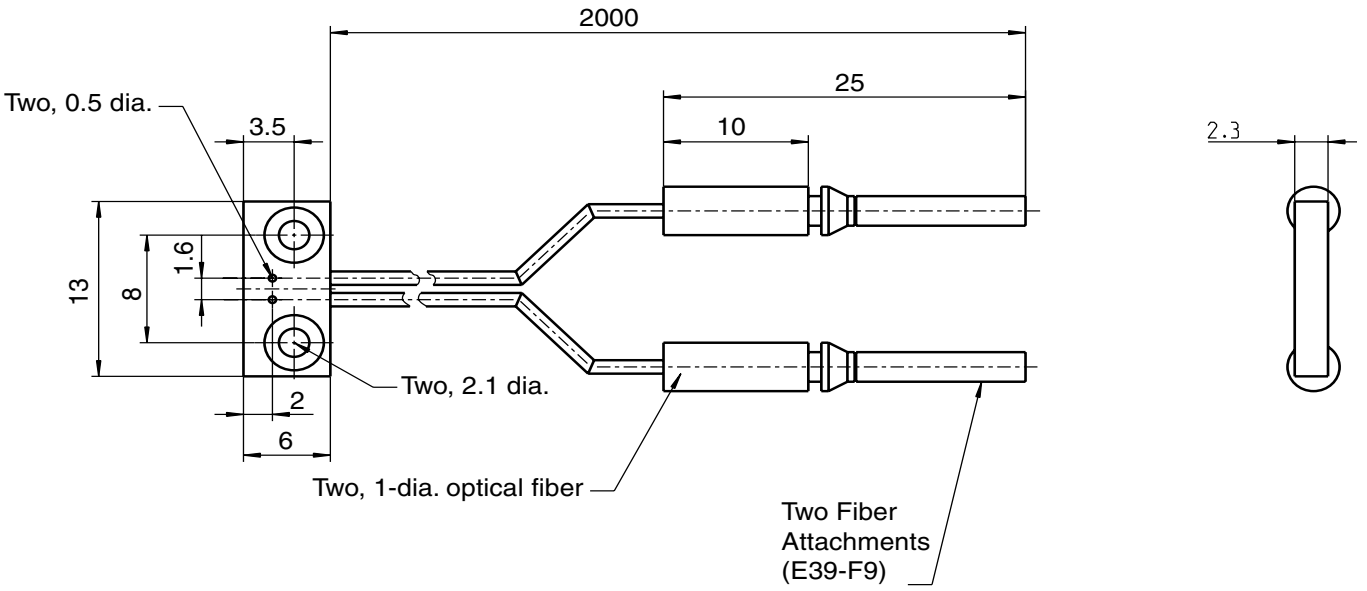
E32-ETS20R



E32-ETS24R



E32-EDS24R



Precautions

Fiber Units

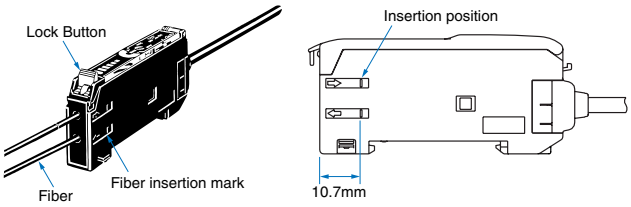
Installation

Fiber Connection and Disconnection

The E3X Amplifier Unit has a lock button. Connect or disconnect the fibers to or from the E3X Amplifier Unit using the following procedures:

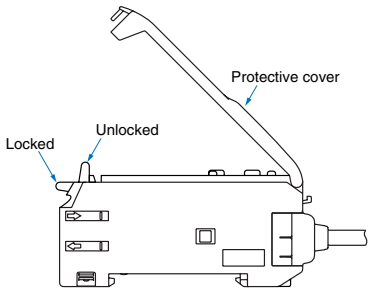
1. Connection

Open the protective cover, insert the fibers according to the fiber insertion marks on the side of the Amplifier Unit, and lower the lock button.



2. Disconnection

Remove the protective cover and raise the lock button to pull out the fiber.



Note:To maintain the fiber properties, confirm that the lock is released before removing the fiber.

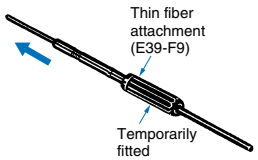
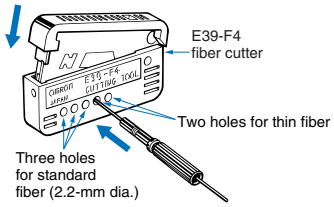
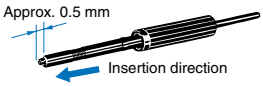
3. Precautions for Fiber Connection/Disconnection

Be sure to lock or unlock the lock button within an ambient temperature range between -10°C and 40°C.

Cutting Fiber

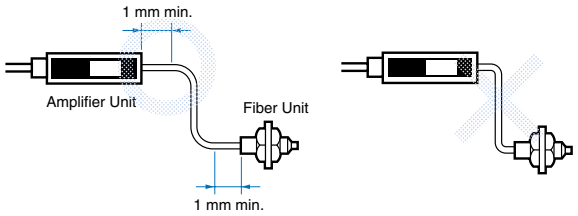
- Insert a fiber into the Fiber Cutter and determine the length of the fiber to be cut.
- Press down the Fiber Cutter in a single stroke to cut the fiber.
- The cutting holes cannot be used twice. If the same hole is used twice, the cutting face of the fiber will be rough and the sensing distance will be reduced. Always use an unused hole.

- Cut a thin fiber as follows:

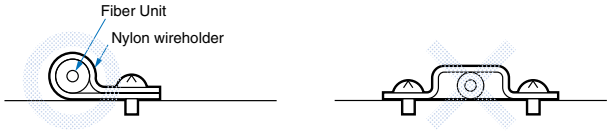
①	An attachment is temporarily fitted to a thin fiber before shipment.	
②	Secure the attachment after adjusting the position of it in the direction indicated by the arrow.	
③	Insert the fiber to be cut into the E39-F4.	
④	Finished state (proper cutting state)	 Note: Insert the fiber in the direction indicated by the arrow.

Connection

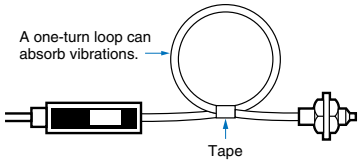
- Do not strain the fiber unit, e.g. do not apply tensile or compression force. (Within 0.98 Nm to 18 Nm) Use special care since the fiber is thin.
- The bending radius of the fiber unit should exceed the admissible bending radius given in "Type/standard price" and "Ratings/performance".
- Do not bend the edge of the fiber units (excluding the E32-T□R and E32-D□R).



- Do not apply excess force on the fiber units.

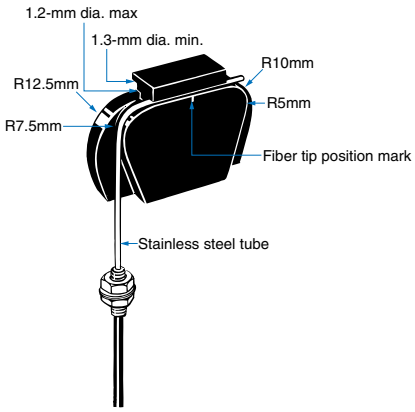


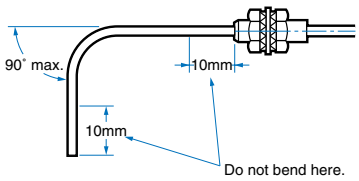
- The fiber head could be break from excessive vibration. To prevent this, the following is applied:



E39-F11 Sleeve Bender

- The bending radius of the stainless steel tube should be as large as possible. The smaller the bending radius becomes, the shorter the sensing distance will be.
- Insert the tip of the stainless steel tube to the sleeve bender and bend the stainless steel tube slowly along the curve of the sleeve bender (refer to the figure).





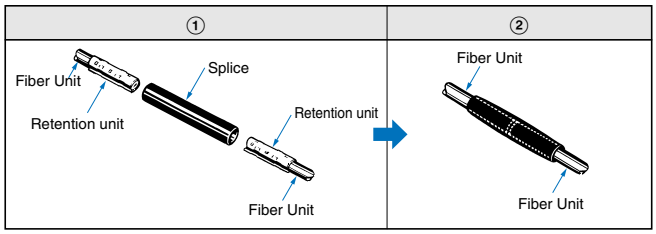
Accessories

Use of E39-R3 Reflector

1. When using an adhesive tape on the rear face, apply it after washing off oil, dust, etc. with detergent from the place of application. The reflector cannot be installed if there remains oil, etc.
2. The E39-R3 cannot be used in places where it is exposed to oil or chemicals.

E39-F10 Fiber Connector

Fit the connector in the following procedure.



- The fiber units should be as close as possible when they are connected. Sensing distance will be reduced by approximately 25% when fibers are connected.

Only 2.2 mm dia. fibers can be connected.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E24E-EN-01

Accessories for E32

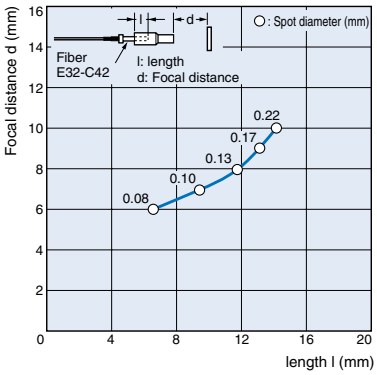
E32

Lens Unit

Shape	Application	Name	Model	Quantity	Applicable Fiber
	Increased sensing distance	Long distance lens units	E39-F1	A total of two pcs.: One each for emitter and receiver	E32-T11L E32-TC200 E32-T11R E32-T11 E32-T61-S E32-T81R-S
	Conversion of detection direction into side view	side view unit	E39-F2		
	Conversion of through-beam model into long distance reflective model	Lens-equipped reflective Unit	E39-F3	One set	
	Conversion of through-beam model into side view reflective model	Reflective side view conversion attachment	E39-F5	1	E32-TC200A
	Detection at 0.1 to 0.6 mm dia. small spot	Small spot lens unit (variable)	E39-F3A	1	E32-C42 (3 mm dia.)
	Detection at 0.5 to 1 mm dia. small spot				E32-D32 (3 mm dia.)
	Focal length 7 mm Detection at 0.1 mm dia. spot	Small spot lens unit (fixed)	E39-F3A-5	1	E32-EC41
	Detection at 0.5 mm dia. spot in 7 mm focal length				E32-EC31
	17 mm focal length Detection at 0.2 mm dia. spot	Long distance/small spot lens unit (fixed)	E39-F3B	1	E32-EC41
	17 mm focal length Detection at 0.5 mm dia. spot				E32-EC31
	Short body for space-saving, max. 4 mm dia. spot in long 20 mm distance	Long distance lens unit (fixed)	E39-F3C	1	E39-EC31 E32-EC41
		Long distance lens unit	E39-F1V	2	E32-T51V and E32-T54V

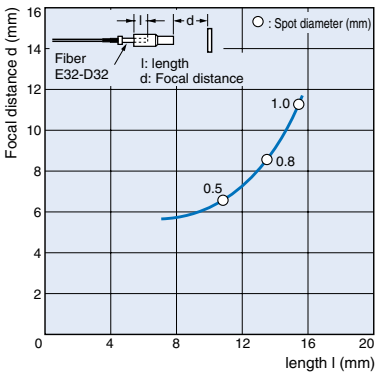
Beam spot characteristic

E39-F3A+E32-C42

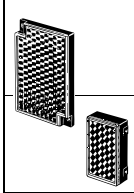


Beam spot characteristic

E39-F3A+E32-D32

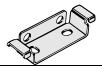
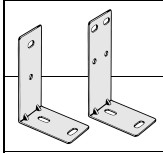


Reflectors

Shape	Name	Sensing distance (default)	Model	Quantity	Remarks
	Reflectors	1.5 m (150 mm) *	E39-R1	1	Retroreflective model attached to E32-R16.
	Small reflector	250 mm (25 mm) *	E39-R3	1	Retroreflective model attached to E32-R21.

* Values in parentheses indicate the minimum required distance between the sensor and reflector.

Mounting Brackets

Shape	Applicable type	Model	Quantity	Remarks
	E3X-DA-N series	E39-L143	1	---
	E3X-DA□V	E39-L148		
	E32-T16	E39-L4	1*	Attached to the product.
	E32-T16P	E39-L94	2	---
	E32-T54V	E39-L54V	2	---

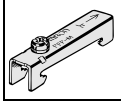
* For the through-beam type, please order two pcs. for the emitter and receiver.

Note: For details, refer to "Mounting bracket list".

Operating Instructions Sticker

Model	Remarks
E39-Y1	Apply this seal to near the sensor.

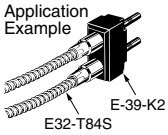
End Plate

Shape	Model	Quantity
	PFP-M	1

Protective Spiral Tubes

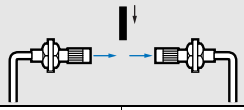
Shape	Application	Model	Tube length	Applicable Fiber
	For protection of fiber	E39-F32A5	500 mm	E32-DC200E E32-D21 E32-DC200F(4) E32-D21R
		E39-F32A	1 m	
		E39-F32B5	500 mm	E32-T21L E32-TC200F(4) E32-TC200E E32-T21 E32-EC31 E32-T21R
		E39-F32B	1 m	
		E39-F32C5	500 mm	E32-T11L E32-T11 E32-TC200 E32-T51 E32-TC200B(4) E32-T11R
		E39-F32C	1 m	
		E39-F32D5	500 mm	E32-D11L E32-D11 E32-DC200 E32-CC200 E32-DC200B(4) E32-ED51 E32-ED11R
		E39-F32D	1 m	

Other Accessories

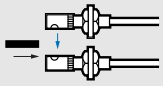
Shape	Application	Name	Model	Applicable Fiber	Remarks
	Used for free cutting of fiber	Fiber Cutter	E39-F4	All fiber unit models that enable free cut	Attached to the fibers that can be cut freely.
	Attachments for small diameter fibers for insertion into amplifier	Attachments for small diameter fibers	E39-F9	E32-T21L E32-DC200E E32-T22L E32-DC200F(4) E32-TC200E E32-D33 E32-T22 E32-ED21R E32-T22R E32-D21 E32-TC200F(4) E32-D32 E32-T21 E32-D24 E32-T24 E32-D24R E32-T24R E32-R21 E32-D21L E32-EC31 E32-ED21R E32-A03 E32-D22L E32-A04 E32-D22R	---
	Used for adding to fiber	Fiber Connector	E39-F10	E32-T11L E32-T14 E32-T12L E32-G14 E32-T17L E32-D11L E32-TC200 E32-DC200 E32-TC200A E32-DC200B(4) E32-TC200B(4) E32-D14L E32-T14L E32-D12	---
	Used for bending the sleeve of sleeved fiber	Sleeve Bender	E39-F11	E32-TC200B(4) E32-TC200F(4) E32-DC200F(4)	---
	Prevention of fiber unit mounting section from breakage	Protective Attachment	E39-K2	E32-T61-S E32-T84S	

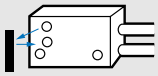
Rating/Performance

Lens Unit

Item								
Name			Long distance lens units					
Application			Increased sensing distance					
Model			E39-F1					
Sensor type			Through-beam 					
Applicable Fiber			E32-T11L	E32-TC200	E32-T61	E32-T11	E32-ET11R	E32-T81R-S
E3X-DA-N	Sensing distance	Super-long-distance	4,000 mm	4,000 mm *	4,000 mm *	4,000 mm *	4,000 mm *	2,600 mm
		Standard	3,200 mm	4,000 mm *	3,400 mm	3,600 mm	3,700 mm	2,100 mm
		Super-high-speed	1,200 mm	2,100 mm	1,300 mm	1,300 mm	1,400 mm	750 mm
Standard sensing object			Opaque: 4 mm dia. min.					
Directional angle			5 to 40°					
Differential distance			---					
Ambient temperature			Use the unit within the operating temperature range of the fiber used. When used with E32-T61-S, use the unit within the range -40 to +200°C.					
Material	Tube:		Brass					
	Lens		Optical glass					

* These models allow a longer sensing distance because their optical fiber length is 2 m.

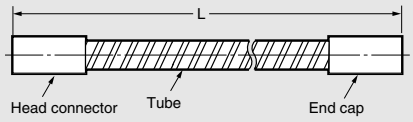
Item								
Name			side view unit					
Application			Conversion of detection direction into side view					
Model			E39-F2					
Sensor type			Through-beam 					
Applicable Fiber			E32-T11L	E32-TC200	E32-T61-S	E32-T11	E32-ET11R	E32-T81R-S
E3X-DA-N	Sensing distance	Super-long-distance	900 mm	800 mm	570 mm	780 mm	500 mm	350 mm
		Standard	800 mm	700 mm	450 mm	660 mm	400 mm	280 mm
		Super-high-speed	400 mm	300 mm	170 mm	250 mm	150 mm	100 mm
Standard sensing object			Opaque: 3 mm dia. min.					
Directional angle			20 to 60°					
Ambient temperature			Use the unit within the operating temperature range of the fiber used. When used with E32-T61-S, use the unit within the range -40 to +200°C.					
Material	Tube:		Brass					
	Lens		Optical glass					

Item			Name	Reflective side view conversion attachment unit
			Application	Conversion of through-beam model into side view reflective model
			Model	E39-F5
			Sensor type	Reflective model 
Applicable Fiber				E32-TC200A
E3X-DA-N	Sensing distance (Standard sensing object)	White paper super-long-distance		1 to 130 mm (100 x 100 mm)
		White paper Standard		1 to 120 mm (100 x 100 mm)
		White paper super-high-speed		2 to 45 mm (100 x 100 mm)
Differential distance				20% max. of sensing distance
Ambient temperature				-40° to 70°C (with no icing or condensation)
Material	Base:			Brass
	Reflector:			Stainless steel

Lens Unit (E39-F3□ series)

Item		Name	Spot lens unit							
		Spot diameter	Adjustable in the range 0.5 to 1.0 mm dia.	Adjustable in the range 0.1 to 0.6 mm dia.	Focal length 7mm 0.5 mm dia. fixed	Focal length 7mm 0.1 mm dia. fixed	Focal length 17mm 0.5 mm dia. fixed	Focal length 17mm 0.2 mm dia. fixed	4 mm max. at 0 to 20 mm	
		Model	E39-F3A		E39-F3A-5		E39-F3B		E39-F3C	
Applicable fiber type			E32-D32	E32-C42	E32-EC31	E32-EC41	E32-EC31	E32-EC41	E32-EC31	E32-EC41
Material	Tube:		Aluminum							
	Lens		Optical glass							

Protective Spiral Tubes

Item		Model	E39-F32A5	E39-F32A	E39-F32B5	E39-F32B	E39-F32C5	E39-F32C	E39-F32D5	E39-F32D
		Sensor type								
Ambient temperature			Operating/Storage: -40 to +150°C (Use the fiber placed inside within the operating temperature of that fiber)							
Ambient humidity			Operating: 35% to 85% Storage: 35% to 95%							
Bending radius			30 mm min.							
Tensile strength			Between head connector or end cap and tube: 1.5 Nm max., tube: 2 Nm max.							
Compression load			Tube: 29.4 N max.							
Material	Head connector		Brass nickel plating							
	End cap		Brass nickel plating							
	Tube		Stainless steel (SUS304)							

Dimensions

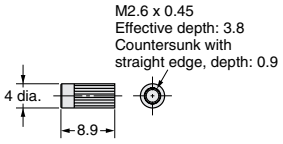
Accessories (Order Separately)

Reflectors H-3
Mounting Brackets H-3
End Plate

PFP-M

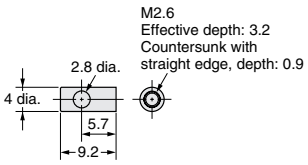
Lens Unit

E39-F1 Long Distance Lens Units



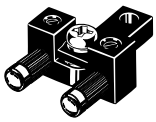
Material: Tube: Brass Lens: Optical glass
Note: One set includes two units

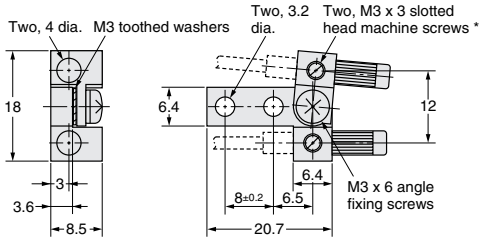
E39-F2 side view unit E39-F2



Material: Tube: Brass Lens: Optical glass
Note: One set includes two units

Lens-equipped Reflective Unit E39-F3

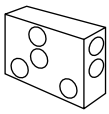


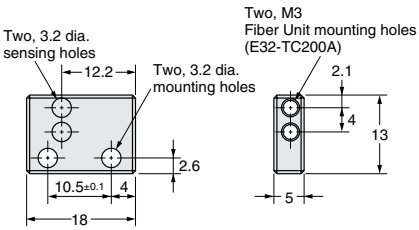


Material: Tube: Brass Base: Aluminum

* Fix the fiber head using the slotted head machines screw.
Do not insert the E39-F1 Lens.

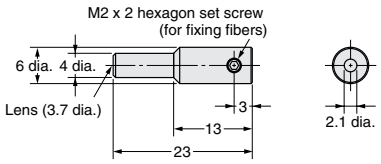
E39-F5 side view Reflective Unit





Material: Base: Brass Reflector Stainless steel
Note: Only the E32-TC200A can be mounted. When mounting it, remove all the supplied nuts and screw it into the E39-F5. (Screw it until it is stopped by the stopper.)

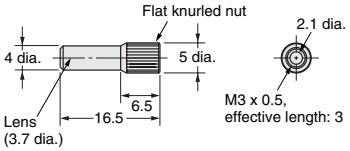
Small Spot Lens Unit E39-F3A



Material: Tube: Aluminum
Optical lens: Optical glass

Note: E32-D32 is a Lens Unit for the E32-C42.

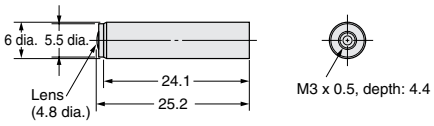
Small Spot Lens Unit E39-F3A-5



Material: Tube: Aluminum
Optical lens: Optical glass

Note: E32-C31 is a Lens Unit for the E32-C41.

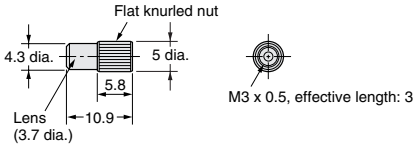
Small Spot Lens Unit E39-F3B



Material: Tube: Aluminum
Optical lens: Optical glass

Note: E32-C31 is a Lens Unit for the E32-C41.

Small Spot Lens Unit E39-F3C

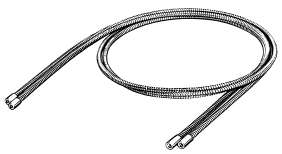


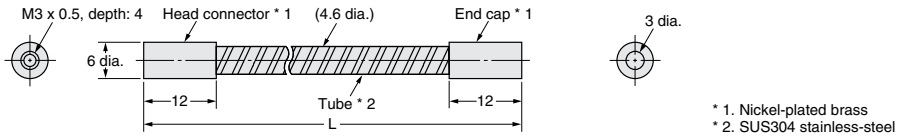
Material: Tube: Aluminum
Optical lens: Optical glass

Note: E32-C31 is a Lens Unit for the E32-C41.

Protective Spiral Tubes

E39-F32A/F32A5
E39-F32B/F32B5

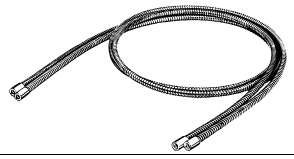


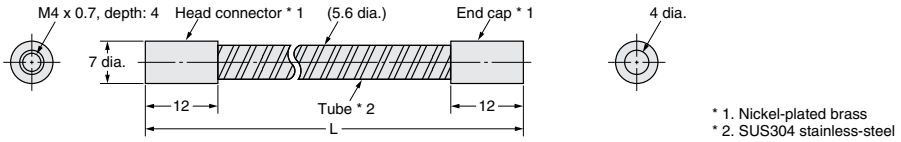


* 1. Nickel-plated brass
* 2. SUS304 stainless-steel

Note: 1 . L is as follows: E39-F32A and E39-F32B: 1,000 E39-F32A5, E39-F32B5: 500
2 . A pair of E39-F32A (5)'s is sold as E39-F32B (5)

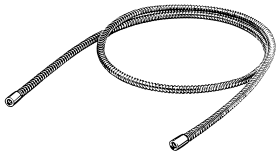
E39-F32C, F32C5

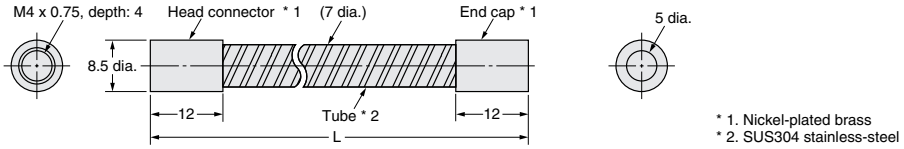




Note: L is as follows: E39-F32C: 1,000, E39-F32C5: 500

E39-F32D/F32D5

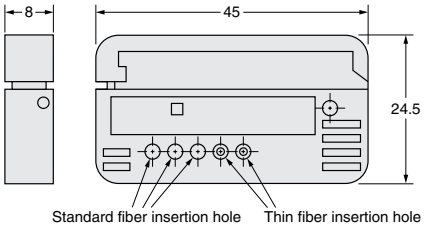




Note: L is as follows: E39-F32D: 1,000 E39-F32A5, E39-F32D5: 500

Other Accessories

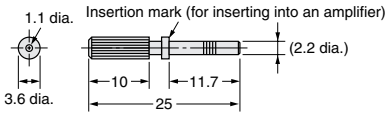
E39-F4 Fiber Cutter



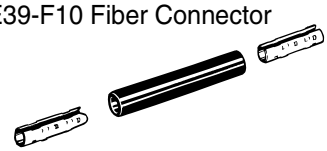
E39-F9 Attachment for Thin Fiber

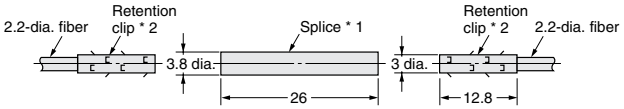
Material: ABS

Note: One set includes two units.
Included with Thin Fiber Unit.

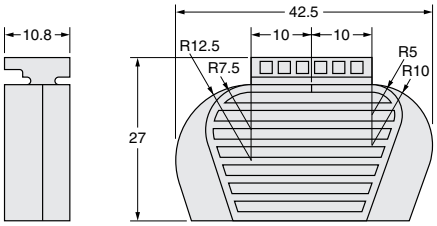


E39-F10 Fiber Connector



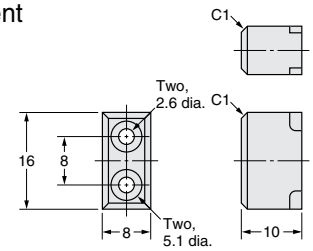


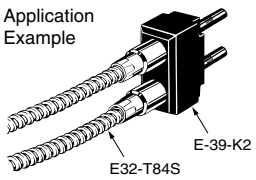
E39-F11 Sleeve Bender



E39-K2 Protective Attachment

Material: ABS





ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E42E-EN-01