

E3ZM

Stainless-Steel Housing (SUS316L) - Ideal for the Food Industry! **PAT Pending**

- Excellent resistance to detergents, disinfectants and jet water spray
- Ecolab Europe certification acquired
- E3Z-size world's smallest square metal photoelectric sensor
- Reversed output polarity protection, external light interference algorithm, etc.
- Complete Compliance with RoHS

 Be sure to read *Safety Precautions* on page 13.



CE

Features



Withstands Detergent and Disinfectant Spray

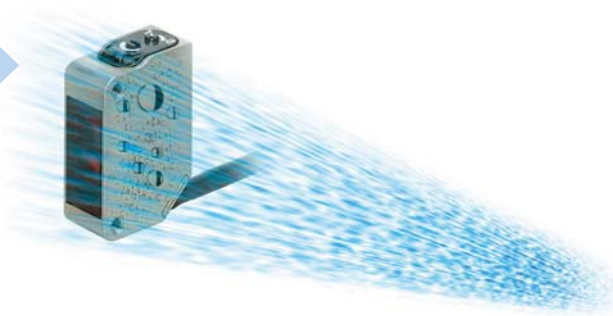
We used SUS316L for the case and the best material for all parts to achieve **200 times the durability of the E3Z** (in 1.5% solution of sodium hydroxide at 70°C) to make the E3ZM suitable for the cleaning conditions of food-processing machinery.



Superior Protective Structure

The first **IP69K*** (DIN 40050-9) protective structure in the world for a square metal photoelectric sensor. Suitable for high-temperature, high-pressure jet water spray cleaning applications.

* Refer to the footnote on page 5 (ratings and specifications table).



Shape and Markings Designed for Greater Hygiene

Few indentations in the shape means less dust and water can collect, making the E3ZM more hygienic. No labels have been used in order to **prevent foreign matter contaminating food** products. The E3ZM model and lot numbers are imprinted using a laser marker.



Rear

Ordering Information

Sensors

Red light Infrared light

Sensing method	Appearance	Connection method	Sensing distance	Model	
				NPN output	PNP output
Through-beam *5		Pre-wired (2 m) *3	15 m	E3ZM-T61	E3ZM-T81
		Connector (M8, 4 pins) *4		E3ZM-T66	E3ZM-T86
		Pre-wired (2 m) *3	0.8 m (apertures built in)	E3ZM-T63	E3ZM-T83
		Connector (M8, 4 pins) *4		E3ZM-T68	E3ZM-T88
Retro-reflective with MSR function		Pre-wired (2 m) *3	4 m (100 mm) *2 (Using E39-R1S)	E3ZM-R61	E3ZM-R81
		Connector (M8, 4 pins) *4		E3ZM-R66	E3ZM-R86
Diffuse-reflective		Pre-wired (2 m) *3	1 m	E3ZM-D62	E3ZM-D82
		Connector (M8, 4 pins) *4		E3ZM-D67	E3ZM-D87
BGS reflective (fixed distance)		Pre-wired (2 m) *3	10 to 100 mm	E3ZM-LS61H	E3ZM-LS81H
		Connector (M8, 4 pins) *4		E3ZM-LS66H	E3ZM-LS86H
		Pre-wired (2 m) *3	10 to 150 mm	E3ZM-LS62H	E3ZM-LS82H
		Connector (M8, 4 pins) *4		E3ZM-LS67H	E3ZM-LS87H
		Pre-wired (2 m) *3	10 to 200 mm	E3ZM-LS64H	E3ZM-LS84H
		Connector (M8, 4 pins) *4		E3ZM-LS69H	E3ZM-LS89H

*1. The Reflector is sold separately. Select the Reflector model most suited to the application.

*2. Values in parentheses indicate the minimum required distance between the Sensor and Reflector.

*3. Pre-wired Models with a 5-m cable are also available for these products. When ordering, specify the cable length by adding "5M" to the end of the model number (e.g., E3ZM-LT61 5M).

M12 Pre-wired Connector Models are also available. When ordering, add "-M1J" to the end of the model number (e.g., E3ZM-R61-M1J 0.3m).

*4. M8 Connector Models are also available with three-pin connectors. When ordering, add "-M5" to the end of the model number (e.g., E3ZM-T66-M5).

This does not apply to BGS Reflective Models, however, because they require 4 pins.

*5. Through-beam Models are also available with a light emission stop function. When ordering, add "-G0" to the end of the model number (e.g., E3ZM-T61-G0).

Accessories

Reflectors

Name	E3ZM-R Sensing distance (typical) *	Model	Quantity	Remarks
Reflector	3 m (100 mm) (rated value)	E39-R1	1	- Reflectors are not provided with Retro-reflective models. - The MSR function is enabled.
	4 m (100 mm) (rated value)	E39-R1S	1	
	5 m (100 mm)	E39-R2	1	
	2.5 m (100 mm)	E39-R9	1	
	3.5 m (100 mm)	E39-R10	1	
Fog Preventive Coating	3 m (100 mm)	E39-R1K	1	
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	

Note: When using a Reflector without a rated value, use 0.7 times typical value as a guideline for the sensing distance.

* Values in parentheses indicate the minimum required distance between the Sensor and Reflector.

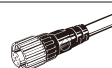
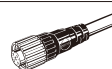
Mounting Brackets

Appearance	Model (Material)	Quantity	Remarks	Appearance	Model (Material)	Quantity	Remarks
	E39-L153 (SUS304)	1	Mounting Brackets		E39-L98 (SUS304)	1	Metal Protective Cover Bracket *
	E39-L104 (SUS304)	1			E39-L150 (SUS304)	1 set	(Sensor adjuster)
	E39-L43 (SUS304)	1	Horizontal Mounting Bracket *		E39-L151 (SUS304)	1 set	Easily mounted to the aluminum frame rails of conveyors and easily adjusted. For left to right adjustment
	E39-L142 (SUS304)	1	Horizontal Protective Cover Bracket *				
	E39-L44 (SUS304)	1	Rear Mounting Bracket		E39-L144 (SUS304)	1	Compact Protective Cover Bracket *

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

* Cannot be used for Standard Connector models.

Sensor I/O Connectors

Size	Cable	Appearance	Cable type		Model
M8 (4 pins)	Standard		2 m	4-wire	XS3F-M421-402-A
			5 m		XS3F-M421-405-A
			2 m		XS3F-M422-402-A
			5 m		XS3F-M422-405-A
M12 (For -M1J models)			2 m	3-wire	XS2F-D421-DC0-A
			5 m		XS2F-D421-GC0-A
			2 m		XS2F-D422-DC0-A
			5 m		XS2F-D422-GC0-A
			2 m	4-wire	XS2F-D421-D80-A
			5 m		XS2F-D421-G80-A
			2 m		XS2F-D422-D80-A
			5 m		XS2F-D422-G80-A

*1. The performance will be IP67 because of the connector specifications.

*2. Cable specifications: Outer coating material: PVC, Nut material: Stainless steel, Degree of protection: IP67 (IEC 60529)

Ratings and Specifications

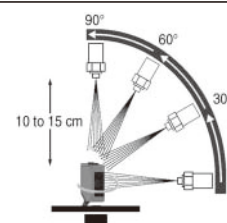
Item	Sensing method	Through-beam		Retro-reflective with MSR function	Diffuse-reflective Models
	NPN output	E3ZM-T61 E3ZM-T66	E3ZM-T63 E3ZM-T68	E3ZM-R61 E3ZM-R66	E3ZM-D62 E3ZM-D67
	PNP output	E3ZM-T81 E3ZM-T86	E3ZM-T83 E3ZM-T88	E3ZM-R81 E3ZM-R86	E3ZM-D82 E3ZM-D87
Sensing distance		15 m	0.8 m	4 m [100 mm] (Using E39-R1S) 3 m [100 mm] (Using E39-R1)	1 m (White paper 300 × 300 mm)
Spot diameter (typical)		---			
Standard sensing object		Opaque: 12-mm dia. min.	Opaque: 2-mm dia. min.	Opaque: 75-mm dia. min.	---
Differential travel		---			20% of sensing distance max.
Black/white error		---			
Directional angle		Emitter, Receiver: 3° to 15°		Sensor: 3° to 10° Reflector: 30°	---
Light source (wavelength)		Infrared LED (870 nm)		Red LED (660 nm)	Infrared LED (860 nm)
Power supply voltage		10 to 30 VDC, including 10% ripple (p-p)			
Current consumption		40 mA max. (Emitter 20 mA max., Receiver 20 mA max.)		25 mA max.	
Control output		Load power supply voltage: 30 VDC max., Load current: 100 mA max. (Residual voltage: 2 V max.) Open-collector output (NPN/PNP output depending on model) Light-ON/Dark-ON switch selectable			
Protection circuits		Reversed power supply polarity protection, Output short-circuit protection, and Reversed output polarity protection		Reversed power supply polarity protection, Output short-circuit protection, Mutual interference prevention, and Reversed output polarity protection	
Response time		Operate or reset: 1 ms max.			
Sensitivity adjustment		One-turn adjuster			
Ambient illumination (Receiver side)		Incandescent lamp: 3,000 lx max., Sunlight: 10,000 lx max.			
Ambient temperature range		Operating: −25 to 55°C, Storage: −40 to 70°C (with no icing or condensation)			
Ambient humidity range		Operating: 35% to 85%, Storage: 35% to 95% (with no condensation)			
Insulation resistance		20 MΩ min. at 500 VDC			
Dielectric strength		1,000 VAC, 50/60 Hz for 1 min			
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions			
Shock resistance		Destruction: 500 m/s ² 3 times each in X, Y, and Z directions			
Degree of protection *		IEC: IP67, DIN 40050-9: IP69K			
Connection method		Pre-wired cable (standard length: 2 m) M8 4-pin Connector			
Indicator		Operation indicator (yellow), Stability indicator (green) (Emitter has only power supply indicator (green).)			
Weight (packed state)	Pre-wired models (with 2-m cable)	Approx. 150 g		Approx. 90 g	
	Connector models	Approx. 60 g		Approx. 40 g	
Materials	Case	SUS316L			
	Lens	PMMA (polymethylmethacrylate)			
	Display	PES (polyethersulfone)			
	Sensitivity adjustment and mode selector switch	PEEK (polyetheretherketone)			
	Seals	Fluoro rubber			
Accessories		Instruction sheet (Note: Reflectors and Mounting Brackets are sold separately.)			

* IP69K Degree of Protection Specifications

IP69K is a protection specification stipulated by DIN 40050 Part 9 of the German standards.

The test item is sprayed with 80°C water from a nozzle of a specified shape at a water pressure of 80 to 100 bar. The amount of water is 14 to 16 liters per minute.

The distance between the test item and the nozzle is 10 to 15 cm. The water is discharged at angles of 0°, 30°, 60°, and 90° from the horizontal plane for 30 seconds at each angle while the test item is rotated horizontally.



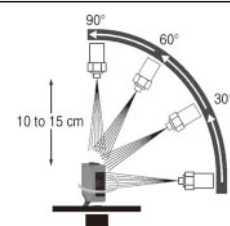
Sensing method		BGS Reflective Models		
Model	NPN output	E3ZM-LS61H E3ZM-LS66H	E3ZM-LS62H E3ZM-LS67H	E3ZM-LS64H E3ZM-LS69H
Item	PNP output	E3ZM-LS81H E3ZM-LS86H	E3ZM-LS82H E3ZM-LS87H	E3ZM-LS84H E3ZM-LS89H
Sensing distance		10 to 100 mm (White paper 100 × 100 mm)	10 to 150 mm (White paper 100 × 100 mm)	10 to 200 mm (White paper 100 × 100 mm)
Spot diameter (typical)		4-mm dia. at sensing distance of 100 mm	12-mm dia. at sensing distance of 150 mm	18-mm dia. at sensing distance of 200 mm
Standard sensing object		---		
Differential travel		3% of sensing distance max.	15% of sensing distance max.	20% of sensing distance max.
Black/white error		5% of sensing distance max.	10% of sensing distance max.	20% of sensing distance max.
Directional angle		---		
Light source (wavelength)		Red LED (650 nm)	Red LED (660 nm)	
Power supply voltage		10 to 30 VDC, including 10% ripple (p-p)		
Current consumption		25 mA max.		
Control output		Load power supply voltage: 30 VDC max., Load current: 100 mA max. (Residual voltage: 2 V max.) Open-collector output (NPN/PNP output depending on model) Light-ON/Dark-ON cable connection selectable		
Protection circuits		Reversed power supply polarity protection, Output short-circuit protection, Reversed output polarity protection, Mutual interference protection		
Response time		Operate or reset: 1 ms max.		
Sensitivity adjustment		---		
Ambient illumination (Receiver side)		Incandescent lamp: 3,000 lx max., Sunlight: 10,000 lx max.		
Ambient temperature range		Operating: −25 to 55°C, Storage: −40 to 70°C (with no icing or condensation)		
Ambient humidity range		Operating: 35% to 85%, Storage: 35% to 95% (with no condensation)		
Insulation resistance		20 MΩ min. at 500 VDC		
Dielectric strength		1,000 VAC, 50/60 Hz for 1 min		
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions		
Shock resistance		Destruction: 500 m/s ² 3 times each in X, Y, and Z directions		
Degree of protection *		IEC: IP67, DIN 40050-9: IP69K		
Connection method		Pre-wired cable (standard length: 2 m) M8 4-pin Connector		
Indicator		Operation indicator (yellow), Stability indicator (green)		
Weight (packed state)	Pre-wired models (with 2-m cable)	Approx. 90 g		
	Connector models	Approx. 40 g		
Materials	Case	SUS316L		
	Lens	PMMA (polymethylmethacrylate)		
	Display	PES (polyethersulfone)		
	Seals	Fluoro rubber		
Accessories		Instruction sheet (Note: Mounting Brackets are sold separately.)		

* IP69K Degree of Protection Specifications

IP69K is a protection specification stipulated by DIN 40050 Part 9 of the German standards.

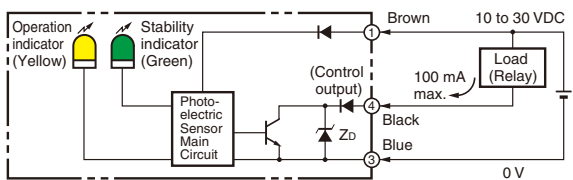
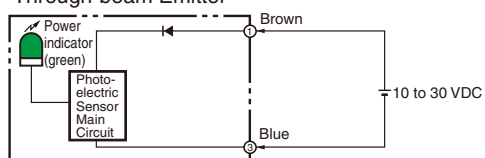
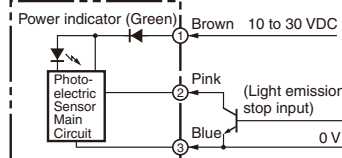
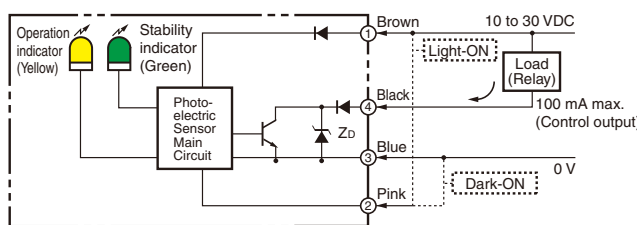
The test item is sprayed with 80°C water from a nozzle of a specified shape at a water pressure of 80 to 100 bar. The amount of water is 14 to 16 liters per minute.

The distance between the test item and the nozzle is 10 to 15 cm. The water is discharged at angles of 0°, 30°, 60°, and 90° from the horizontal plane for 30 seconds at each angle while the test item is rotated horizontally.



I/O Circuit Diagrams

NPN Output

Model	Operation mode	Timing charts	Operation selector	Output circuit
E3ZM-T61 E3ZM-T63 E3ZM-T66 E3ZM-T68 E3ZM-R61 E3ZM-R66 E3ZM-D62 E3ZM-D67	Light-ON	Light incident  Light interrupted  Operation indicator (yellow) ON  OFF  Output transistor ON  OFF  Load (e.g., relay) Operate  Reset  (Between brown and black leads)	L side (LIGHT ON)	Through-beam Receivers, Retro-reflective Models, Diffuse-reflective Models 
	Dark-ON	Light incident  Light interrupted  Operation indicator (yellow) ON  OFF  Output transistor ON  OFF  Load (e.g., relay) Operate  Reset  (Between brown and black leads)	D side (DARK ON)	
	Through-beam Emitter 			
E3ZM-T61-G0 E3ZM-T63-G0 E3ZM-T66-G0 E3ZM-T68-G0	---	Light emission stop function ON  OFF  (Between blue (3) and pink (2) leads) Emitter LED ON  OFF  Indicator (green) ON  OFF 	---	Through-beam Emitter 
E3ZM-LS61H E3ZM-LS66H E3ZM-LS62H E3ZM-LS67H E3ZM-LS64H E3ZM-LS69H	Light-ON	Operation indicator (yellow) ON  OFF  Output transistor ON  OFF  Load (e.g., relay) Operate  Reset  (Between brown and black leads)	Connect pink lead (2) to brown lead (1).	
Dark-ON	Operation indicator (yellow) ON  OFF  Output transistor ON  OFF  Load (e.g., relay) Operate  Reset  (Between brown and black leads)	Connect pink lead (2) to blue lead (3) or leave open.		

PNP Output

Model	Operation mode	Timing charts	Operation selector	Output circuit
E3ZM-T81 E3ZM-T83 E3ZM-T86 E3ZM-T88 E3ZM-R81 E3ZM-R86 E3ZM-D82 E3ZM-D87	Light-ON	Light incident: ON Light interrupted: OFF Operation indicator (yellow): ON OFF Output transistor: ON OFF Load (e.g., relay): Operate Reset (Between blue and black leads)	L side (LIGHT ON)	Through-beam Receivers, Retro-reflective Models, Diffuse-reflective Models
	Dark-ON	Light incident: ON Light interrupted: OFF Operation indicator (yellow): ON OFF Output transistor: ON OFF Load (e.g., relay): Operate Reset (Between blue and black leads)	D side (DARK ON)	
		Through-beam Emitter 		
E3ZM-T81-G0 E3ZM-T83-G0 E3ZM-T86-G0 E3ZM-T88-G0	---	Light emission stop function: ON OFF (Between brown (1) and pink (2) leads) Emitter LED: ON OFF Indicator (green): ON OFF	---	Through-beam Emitter
E3ZM-LS81H E3ZM-LS86H E3ZM-LS82H E3ZM-LS87H E3ZM-LS84H E3ZM-LS89H	Light-ON	Operation indicator (yellow): ON OFF Output transistor: ON OFF Load (e.g., relay): Operate Reset (Between blue and black leads)	Connect pink lead (2) to brown lead (1).	
	Dark-ON	Operation indicator (yellow): ON OFF Output transistor: ON OFF Load (e.g., relay): Operate Reset (Between blue and black leads)	Connect pink lead (2) to blue lead (3) or leave open.	

Connector Pin Arrangement

M8 Connector (-CN)/M8 Pre-wired Connector

M8 4-pin Connector Pin Arrangement



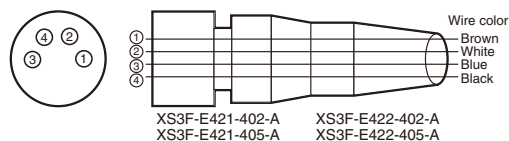
M8 Pre-wired 3-pin Connector

M8 3-pin Connector Pin Arrangement



Plugs (Sensor I/O Connectors)

M8 4-pin Connectors



Dimensions

Sensors

Through-beam Models

Pre-wired Models

E3ZM-T61(-G0)

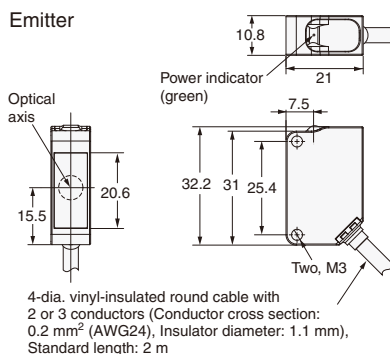
E3ZM-T81(-G0)

E3ZM-T63(-G0)

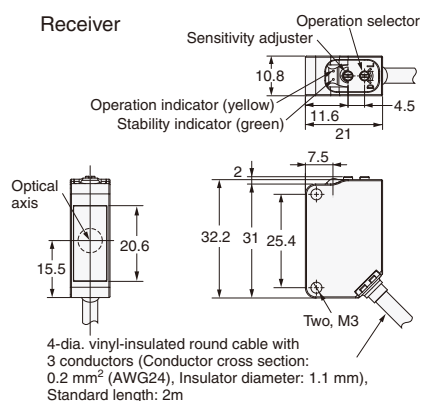
E3ZM-T83(-G0)



Emitter



Receiver



Through-beam Models

Standard Connector

E3ZM-T66(-G0)

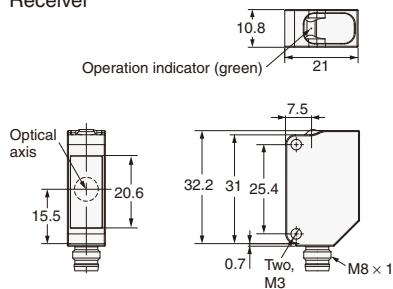
E3ZM-T86(-G0)

E3ZM-T68(-G0)

E3ZM-T88(-G0)

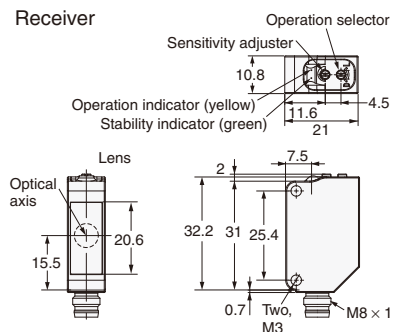


Receiver



Terminal No.	Specifications
1	+V
2	Light emission stop input (-G0 only)
3	0 V
4	---

Receiver



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

Retro-reflective Models

Pre-wired Models

E3ZM-R61

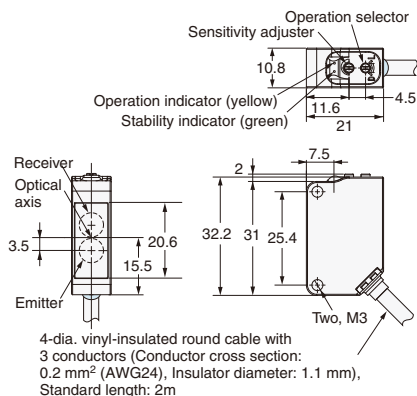
E3ZM-R81

Diffuse-reflective Models

Standard Connector

E3ZM-D62

E3ZM-D82



Retro-reflective Models

Standard Connector

E3ZM-R66

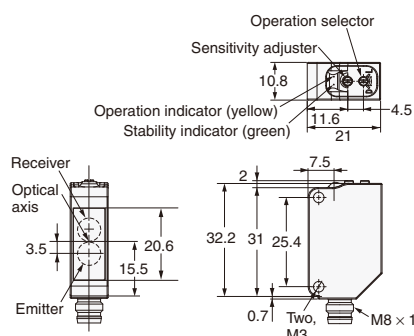
E3ZM-R86

Diffuse-reflective Models

Standard Connector

E3ZM-D67

E3ZM-D87



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

BGS Reflective Models

Pre-wired Models

E3ZM-LS61H

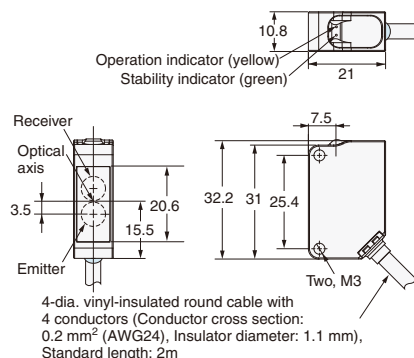
E3ZM-LS62H

E3ZM-LS64H

E3ZM-LS81H

E3ZM-LS82H

E3ZM-LS84H



BGS Reflective Models

Standard Connector

E3ZM-LS66H

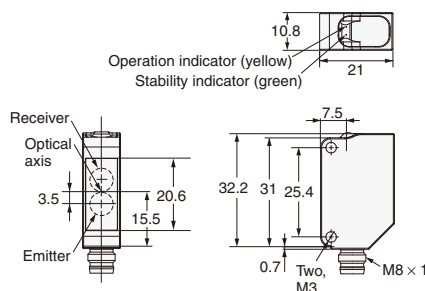
E3ZM-LS67H

E3ZM-LS69H

E3ZM-LS86H

E3ZM-LS87H

E3ZM-LS89H



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