Slot-type Photomicrosensor

EE-SX97

CSM_EE-SX97_DS_E_1_2

CE

Built-in connector enables downsizing and easier connection. Protective circuit for safe operation.

- A built-in connector minimizes the shape and dimensional requirements.
- Two outputs: light-ON and dark-ON.
- Complete lineup including seven different shapes.
- Safer operation with built-in power supply reverse polarity protection.
- Output overcurrent protection with a thermal shutdown circuit (patent pending). *1
- The indicator can be seen from many directions to enable installation in more locations.
- Connector with lock that mates with commercially available connectors. *2
- Output overcurrent protection is provided only on output 2 (OUT2) on NPN models.
 Recommended connector:
 - J.S.T. Mfg. Co., Ltd. Contacts: SPHD-001T-P0.5, Housing: PAP-04V-S Ask the manufacturer of the connector for details.

Be sure to read the *Safety Precautions* on page 5.



Built-in Connector for Downsizing and Easier Connection

A built-in connector minimizes the shape and dimensional requirements. And wiring costs can be reduced by using commercially available connectors.



Safer Operation with Built-in Power Supply Reverse Polarity Protection

The built-in power supply reverse polarity protection protects against reverse connection of the power supply or outputs for safer operation at the assembly site.



Reverse polarity protection

Built-in Thermal Shutdown Circuit

Control output 2 on models with NPN outputs is protected from output overcurrents by a built-in thermal shutdown circuit.



Easy-to-see Indicator

The indicator can be seen from up to four directions to enable installation in more locations.



Two Outputs: Light-ON and Dark-ON

All models provide both a light-ON and dark-ON output so that the output can be switched according to the application simply by changing the wiring.

Ordering Information

Sensors								Infrared light
Appearance	Sensing	Connecting	Sonoing distance		Operating	Indicator	Model	
Appearance	method	method	Sensing	uistance	mode	mode	NPN output	PNP output
Standard							EE-SX970-C1	EE-SX970P-C1
L-shaped							EE-SX971-C1	EE-SX971P-C1
T-shaped, slot center 7 mm	Through- beam type (with slot)	ugh- n type slot) (4 poles)			Dark-ON/ Light-ON (2 outputs) Incident light EE-SX97 EE-SX97 EE-SX97 EE-SX97 EE-SX97 EE-SX97 EE-SX97 EE-SX97 EE-SX97	EE-SX972-C1	EE-SX972P-C1	
Close-mounting				5 mm (slot width)		Incident light	EE-SX974-C1	EE-SX974P-C1
T-shaped, slot center 10 mm						EE-SX975-C1	EE-SX975P-C1	
F-shaped							EE-SX976-C1	EE-SX976P-C1
R-shaped						EE-SX977-C1	EE-SX977P-C1	

Accessories (Order Separately)

Туре	Cable length	Model
Connector with Cable	1 m	EE-1017 1M
Connector with Cable	3 m	EE-1017 3M
Connector with Pohot Coble	1 m	EE-1017-R 1M
Connector with Robot Cable	3 m	EE-1017-R 3M

Ratings and Specifications

		Туре	Standard	L-shaped	T-shaped, slot center 7 mm	Close-mount- ing	T-shaped, slot center 10 mm	F-shaped	R-shaped	
		NPN	EE-SX970-C1	EE-SX971-C1	EE-SX972-C1	EE-SX974-C1	EE-SX975-C1	EE-SX976-C1	EE-SX977-C1	
Item		PNP	EE-SX970P-C1	EE-SX971P-C1	EE-SX972P-C1	EE-SX974P-C1	EE-SX975P-C1	EE-SX976P-C1	EE-SX977P-C1	
Sensin	g distan	ce	5 mm (slot width)							
Sensin	g object		Opaque: 2 × 0.	8 mm min.						
Differe	ntial dist	ance	0.025 mm max	. *1						
Light so length)	ource (P	eak wave-	Infrared LED with a peak wavelength of 940 nm							
Indicate	or		Light indicator	(orange LED)						
Supply	voltage		5 to 24 VDC \pm	10%, ripple (p-p): 10% max.					
Curren	t consun	nption	21 mA max.							
Control output		Load power supply voltage: 5 to 24 VDC, Load current: 50 mA max., Off-state current : 0.5mA max, 50 mA load current with a residual voltage of 1.0 V max., 5 mA load current with a residual voltage of 0.4 V max.								
Protection circuit		ıit	Power supply reverse polarity protection; output reverse polarity protection; overcurrent protection (only OUT2 on models with NPN output)							
Response frequency		uency	1 kHz min. (3 kHz average) *2							
Ambient illumination		ation	1,000 lx max. with fluorescent light on the surface of the receiver							
Ambient temperature range		Operating: -25 to 55°C Storage: -30 to 80°C (with no icing or condensation)								
Ambier	nt humid	ity range	Operating: 5% to 85% Storage: 5% to 95% (with no icing or condensation)							
Vibration resistance (De- struction)		10 to 2,000 Hz 0.75-mm single amplitude (15-min periods, 10 cycles) each in X, Y, and Z directions								
Shock resistance (De- struction)		Destruction: 500 m/s ² for 3 times each in X, Y, and Z directions								
Degree of protection		IEC 60529 IP50								
Connecting method		Connector								
Weight (Packed state)		Approx. 3 g								
Mate-	Case/C	over	Polybutylene te	erephthalate (Pl	BT)					
rial Emitter/receiver Polycarbonat				vcarbonate (PC)						

*1. The differential distance is the value when a sensing object is moved in a lateral direction to the slot.*2. The response frequency was measured by detecting the following rotating disk.





Connector

Product		Connector with Cable	Connector with Robot Cable			
	Model	EE-1017	EE-1017-R			
Item	Appearance					
Contact resis	stance	25 m Ω max. (at 10 mA DC and 20 mV max.)				
Insertion stre	ength	20 N max.				
Surplus strer	ngth	1.5 N min.				
Cable length		1 m, 3 m				
Ambient temperature range		-10 to +60°C				
Matariala	Housing	Nylon				
waterials	Contact	Phosphor bronze				

Engineering Data (Typical)

Sensing Position Characteristics

EE-SX970



Sensing Position Characteristics



Repeated Sensing Position Characteristics EE-SX970



Vcc = 24 V, No. of repetitions: 20, Ta = 25°C Differential distance = 0.025 mm max.

Note: Data is provided for dark conditions. Light interference and the translucence of the sensing object can affect operation.

I/O Circuit Diagrams

Output configu- ration	Model	Output transistor operation status	Timing charts	Output circuit
NPN output	EE-SX970-C1 EE-SX971-C1 EE-SX972-C1 EE-SX974-C1 EE-SX975-C1 EE-SX976-C1 EE-SX977-C1	OUT1: Light-ON OUT2: Dark-ON	Light incident Light interrupted Light indicator ON (orange) OFF Output 1 ON transistor OFF Load 1 Operates (relay) Releases Output 2 ON transistor OFF Load 2 Operates (relay) Releases	Light indicator Upt indicator (coange) Main circuit Control (Control UT1 Control UT2 (Control (Contr
PNP output	EE-SX970P-C1 EE-SX971P-C1 EE-SX972P-C1 EE-SX974P-C1 EE-SX975P-C1 EE-SX976P-C1 EE-SX977P-C1			Light indicator Ught indicator (circuit Main circuit Main circuit Main circuit Main Control output) Control output

Safety Precautions

Refer to Warranty and Limitations of Liability.

🔥 WARNING

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



Operating Environment

These Photomicrosensors have an IP50 (conforms to IEC) enclosure and do not have a water-proof or dust-proof structure. Therefore, do not use them in applications in which the sensor will be subjected to splashes from water, oil, or any other liquid. Liquid entering the Sensor may result in malfunction.

Precautions for Correct Use

Make sure that this product is used within the rated ambient environment conditions.

Installation

• Mount the Sensor with two M3 screws, using plain washers and spring washers to ensure the screws will not become loose. Use a tightening force of 0.54 N·m max.

Wiring

Unused Output Lines

Be sure to isolate output lines that are not going to be used.

Wiring method

Connection is made using a connector. Do not solder to the pins (leads). The pins (leads) are soldered to the internal board of the Sensor. Therefore, direct soldering of the pins (leads) may result in an internal disconnection causing malfunction.

Others

- The power cable connected to the Sensor must not be more than 10 m in length.
- Only output 2 (OUT2) on NPN models is provided with overcurrent protection.

If an overcurrent occurs, heat generated by the output transistor will activate the thermal shutdown circuit and OUT2 will turn OFF. Check the wiring and load current and cycle the power supply. If there is no overcurrent, normal operation will be resumed. (The thermal shutdown circuit will be activated again if there is an overcurrent.)

This function does not provide protection against load short circuits. If the electric power of the output transistor increases due to a load short-circuit or near load short-circuit, the Sensor may be damaged.

• An output pulse may occur when the power supply is turned ON depending on the power supply and other conditions. The operation of the Sensor will be stable 100 ms after turning ON the power supply.

Dimensions

Sensors EE-SX970-C1 EE-SX970P-C1



Terminal Arrangement					
1	+	Vcc			
2	1	OUTPUT1			
3	2	OUTPUT2			
4	-	GND (0 V)			

Mounting screw holes







Terminal Arrangement

_		-
1	+	Vcc
2	1	OUTPUT1
3	2	OUTPUT2
4	-	GND (0 V)

Mounting screw holes





EE-SX976-C1 EE-SX976P-C1



Vcc

OUTPUT1

OUTPUT2 GND (0 V)

ΜЗ

EE-SX977-C1 EE-SX977P-C1



Accessories (Order Separately) Connector



Read and Understand This Catalog

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