

Pushbutton-type Photomicrosensor EE-SA701/801

CSM_EE-SA701_801_DS_E_4_1

Using a pushbutton enables accurately detecting difficult-to-detect objects.

- Conforms to standards for semiconductor FOUP cassettes to enable accurately detecting FOUP cassettes without being affected by the material, color, or reflectance of the bottoms of the cassettes.
- Thin design enables mounting in a wider range of applications, e.g., on transfer arms.
- Increased visibility with 4-direction indicator.
- Optical detection of actuator operation provides a long life (mechanical life: 5 million operations min.).
- Models available with PNP or NPN output.
- Models are available with very flexible robot cable.



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

Ordering Information

List of Models

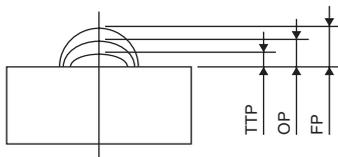
Appearance	Sensing distance	Sensing method	Operation mode	Cable length	Model	
					NPN output	PNP output
	(See note 2.) 0 to 3.5 mm (pressed position) (See note 1.)	Pushbutton	ON with no load	1 m	EE-SA801A 1M	EE-SA801R 1M
			OFF with no load	1 m (robot cable)	EE-SA801A-R 1M	EE-SA801R-R 1M
					EE-SA701-R 1M	EE-SA701P-R 1M

Note: 1. Distance from the top surface of the housing to the top of the actuator.
 2. Output reverses between 3.5 and 4.5 mm.

Ratings and Specifications

Item	Model	NPN output	EE-SA801A	EE-SA801A-R	EE-SA701-R
		PNP output	EE-SA801R	EE-SA801R-R	EE-SA701P-R
Indicator		Light red when actuator is pressed.			Lit red while there is no load on actuator
Operation Specifications (See	Free position (FP)	5.0±0.4 mm			
	Operating position (OP)	3.5 to 4.5 mm (See note 2.)			
	Total travel position (TTP)	0 mm max.			
Operating load (See note 3.)		3 N max. (typical: 0.5 N)			
Supply voltage		12 to 24 VDC±10%, ripple (p-p): 10% max.			
Current consumption		35 mA max.			
Control output		NPN Models: NPN open collector, 5 to 24 VDC, 50 mA max.; residual voltage of 0.4 V max. at 50-mA load current OFF current: 0.5 mA max. PNP Models: PNP open collector, 5 to 24 VDC, 50 mA max.; residual voltage of 0.4 V max. at 50-mA load current OFF current: 0.5 mA max.			
External diagnosis input	Input	NPN Models Emission OFF: Shorted to 0 V or 0.5 V max. (source current: 30 mA max.) Emission ON: Open (leakage current: 0.4 mA max.) PNP Models Emission OFF: Shorted to +DC or +DC-0.5 V max. (sink current: 30 mA max.) Emission ON: Open (leakage current: 0.4 mA max.)			
	Response time	1 ms max.			
Protection circuits		Reversed power supply polarity protection			
Ambient temperature range		Operating: -25 to +55°C Storage: -30 to +60°C (with no icing or condensation)			
Ambient humidity range		Operating: 5% to 85% Storage: 5% to 95% (with no condensation)			
Mechanical durability		5,000,000 operations min. (One operation is from the free position to operating position and back to the free position.)			
Vibration resistance		Destruction: 10 to 500 Hz, 1.0-mm single amplitude or 150 m/s ² 3 times each in X, Y, and Z directions for 11 min. each			
Shock resistance		Destruction: 500 m/s ² for 3 times each in X, Y, and Z directions			
Degree of protection		IEC IP40			
Connecting method		Pre-wired (standard cable length: 1 m)	Pre-wired (robot cable length: 1 m)		
Weight		Approx. 16.1 g			
Material	Case	Polycarbonate			
	Actuator	Polyacetal			
Accessories		Instruction Manual			

Note: 1. Free position (FP): The position of the top of the actuator when no force is being applied to the actuator.
 Operating position (OP): The position of the top of the actuator when the actuator is pressed and the output transistor changes from OFF to ON for the EE-SA701-R/-SA701P-R and from ON to OFF for all other models.
 Total travel position (TTP): The position of the top of the actuator when the actuator is pressed as far as it can be pressed.



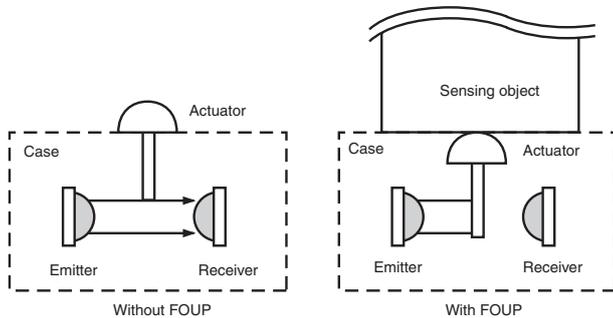
- This does not indicate that the output will be ON from 3.5 to 4.5 mm, but rather that the output will change from ON to OFF at some point between 3.5 and 4.5 mm.
- The force required to press the actuator from the FP to the OP.

I/O Circuit Diagrams

Model	Operating Mode	Timing chart	Output circuit
EE-SA801A EE-SA801A-R	ON with no load		
EE-SA701-R	OFF with no load		
EE-SA801R EE-SA801R-R	ON with no load		
EE-SA701P-R	OFF with no load		

Operating Principles

This is a pushbutton-type sensor. An emitter (GaAs infrared LED) and receiver (Si photo IC) are positioned across from each other inside the sensor and light is received when there is no sensing object. When the sensing object presses the actuator, the light path between the emitter and receiver is broken so that the receiver no longer receives light.

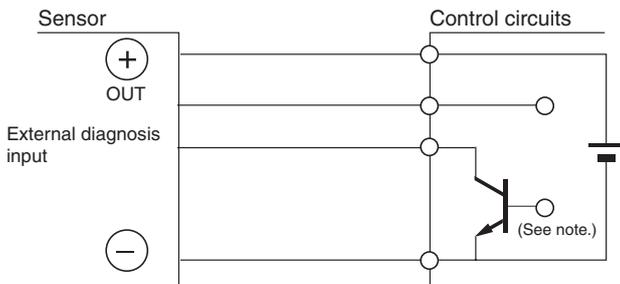


This Sensor provides an external diagnosis function and stability checking function.

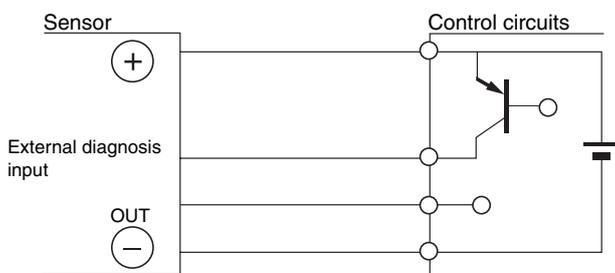
(1) External Diagnosis Function

The light emission from the LED can be stopped by using the following circuit configuration. This enables checking the operation of the receiver by turning the LED ON and OFF when there is no load.

EE-SA801A/-SA-801A-R/-SA701-R



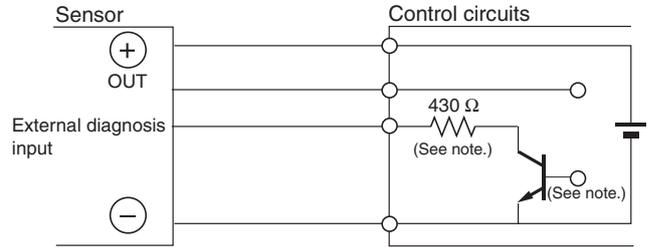
EE-SA801R/-SA-801R-R/-SA701P-R



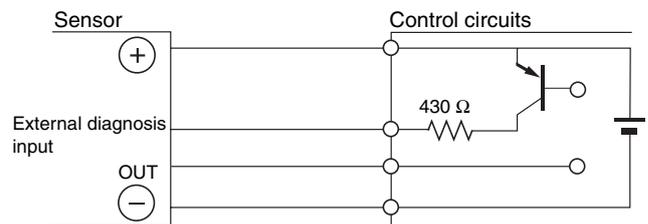
(2) Stability Checking Function

The light intensity emitted by the LED can be reduced by 20% by using the following circuit configuration. By doing so, the light reception operation at 80% light intensity with no sensing object (same as 100%, i.e., the output transistor should turn ON) can be tested in advance to check for malfunctions caused by deterioration of LED light intensity.

EE-SA801A/-SA-801A-R/-SA701-R



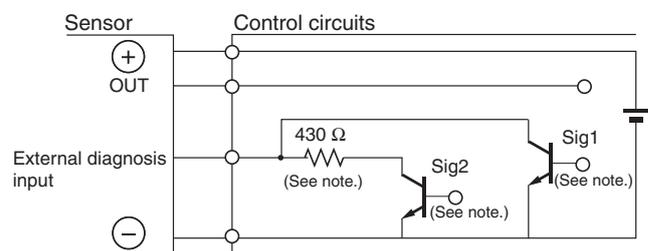
EE-SA801R/-SA-801R-R/-SA701P-R



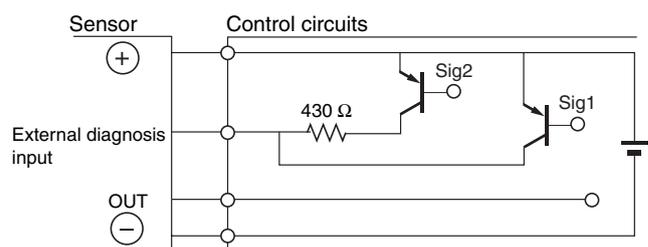
(3) Using Both Functions Simultaneously

Use the following circuit configuration when both the external diagnosis function (Sig1) and the stability checking function (Sig2) are required.

EE-SA801A/-SA-801A-R/-SA701-R



EE-SA801R/-SA-801R-R/-SA701P-R



Note: Use a transistor that is capable of switching 50 mA at 10 V. The resistor must have a power rating of 1/8 W min.

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.



Precautions for Correct Use

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

● **Mounting**

Mount the Photomicrosensor securely on a flat surface using M3 pan head screws, and tighten the mounting screws using a tightening force of 0.59 N·m max.

Adjustment

The EE-SA801 requires 10 ms to be in stable operation after power is supplied. If separate power supplies are used for the EE-SA801 and load, be sure to supply power to the EE-SA801 before supplying power to the load.

Operating Environment

- The EE-SA801 is not watertight. Do not use the EE-SA801 outdoors.
- Do not use the EE-SA801 in places where water, oil, or chemical may be sprayed onto the EE-SA801. The exterior coverings of the EE-SA801 are made of polycarbonate. Keep the coverings away from any alkaline, aromatic hydrocarbon, or aliphatic chloride hydrocarbon solvents, all of which will damage the coverings.

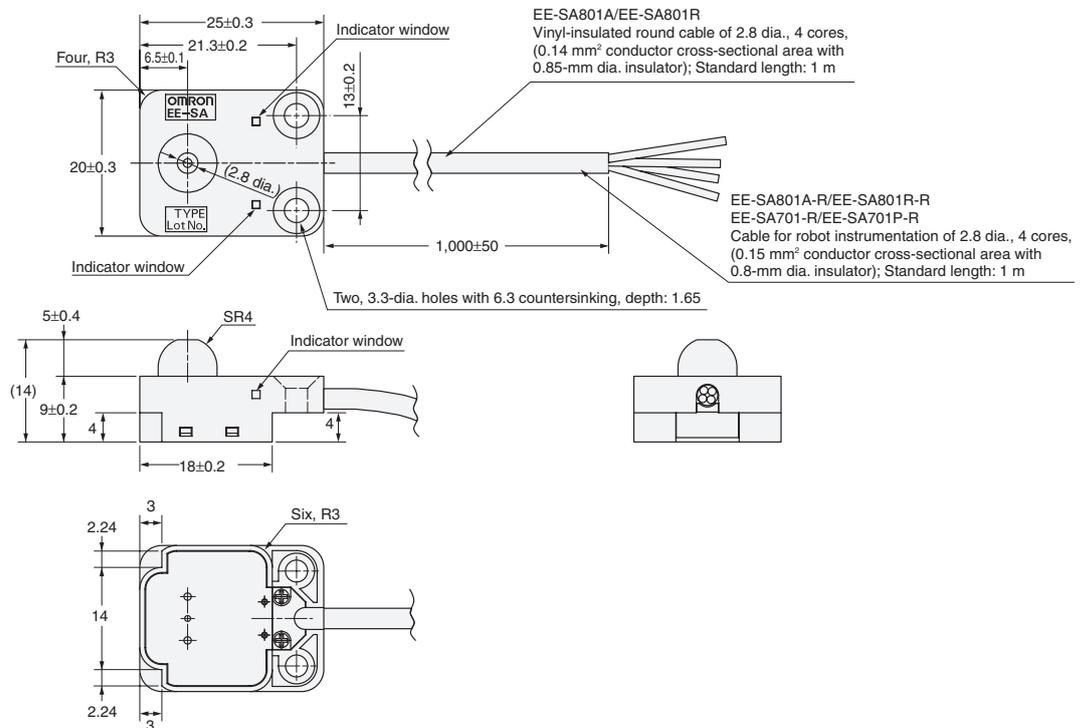
(Unit: mm)

Dimensions

Tolerance class IT16 applies to dimensions in this datasheet unless otherwise specified.

Sensor

EE-SA801A/-SA801A-R
 EE-SA801R/-SA801R-R
 EE-SA701-R
 EE-SA701P-R



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