

# BS5-P Series

## Push Button Type Photomicro Sensors

### ■ Features

- Button operation enables accurate detection regardless of material, color, or reflectance of target object
- Optimized for transport detection of semiconductor wafer enclosures (FOUP, FOSB, etc.)
- Optical detection of button operation guarantees mechanical life cycle of 5 million operations
- Total of 4 red LED indicators (side:2, top:2) for higher visibility of operation status
- Increased product durability with steel mounting brackets
- Emitter OFF function and check stable operation functions
- Built-in reverse polarity protection circuit and output short overcurrent protection circuit



**!** Please read "Safety Considerations" in the instruction manual before using.

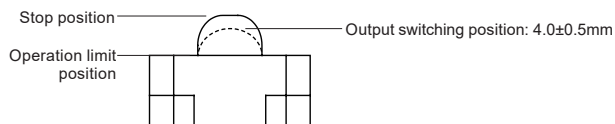


### ■ Specifications

Model	NPN open collector output	<b>BS5-P1ML</b>	<b>BS5-P1MD</b>
	PNP open collector output	<b>BS5-P1ML-P</b>	<b>BS5-P1MD-P</b>
Operation method <sup>*1</sup>	Push button type		
Button operation <sup>*2</sup>	Stop position	5.0±0.4mm	
	Output switching position	4.0±0.5mm	
	Operation limit position	Below 0mm	
Operation load <sup>*3</sup>	Max. 3N (max. 0.3kgf)		
Power supply	12-24VDC $\pm$ 10% (ripple P-P: max. 10%)		
Current consumption	Max. 35mA		
Light source	Infrared LED (940nm)		
Operation mode	Light ON (output OFF when button is pushed)	Dark ON (output ON when button is pushed)	
Control output	NPN or PNP open collector output ·Load voltage: max. 26.4VDC $\pm$ ·Load current: max. 50mA ·Residual voltage: max. 1VDC $\pm$		
External input <sup>*4</sup>	NPN output	Emitter OFF: short at 0V or max. 0.25VDC $\pm$ (outflow current max. 30mA) Emitter ON: open (leakage current max. 0.4mA)	
	PNP output	Emitter OFF: short at +V or min. -0.25VDC $\pm$ of +V (absorption current max. 30mA) Emitter ON: open (leakage current max. 0.4mA)	
	Response	Under 1ms	
Protection circuit	Reverse polarity protection circuit, output short overcurrent protection circuit		
Indicator	Operation indicator: red LED		
Insulation resistance	Over 20M $\Omega$ (at 250VDC megger)		
Noise immunity	$\pm$ 240V of square wave noise (pulse width:1 $\mu$ s) from the noise simulator		
Dielectric strength	1,000VAC at 50/60Hz for 1min		
Vibration	1.5mm amplitude at 10 to 55Hz frequency in each X, Y, Z direction for 2 hours		
Shock	500m/s <sup>2</sup> (approx. 50G) in each X, Y, Z direction for 3 times		
Mechanical life cycle	Min. 5,000,000 operations (1 operation = stop position - operation limit position - stop position)		
Environment	Ambient illuminance	Fluorescent lamp: max. 1,000lx (receiver illuminance)	
	Ambient temperature	-20 to 55°C, storage: -25 to 70°C	
	Ambient humidity	35 to 85%RH, storage: 35 to 85%RH	
Protection structure	IP40 (IEC standard)		
Material	Case: polycarbonate + glass fiber, button: polyoxymethylene, sleeve: SUS304 (steel use stainless 304)		
Cable	$\varnothing$ 3mm, 4-wire, 1m (AWG 28, core diameter: 0.08mm, no. of core wires: 19, insulator diameter: $\varnothing$ 0.88mm)		
Approval	CE		
Weight <sup>*5</sup>	Approx. 50g (approx. 30g)		

<sup>\*1</sup>: Detection occurs when the button is pushed and the light source is blocked.

<sup>\*2</sup>: Stop position: position of the button without any applied pressure  
Output switching position: position where the output switches ON/OFF  
Operation limit position: position of the button when fully pushed



<sup>\*3</sup>: Pressure required to push the button from stop position to output switching position

<sup>\*4</sup>: External input when using emitter OFF function or check stable operation functions.

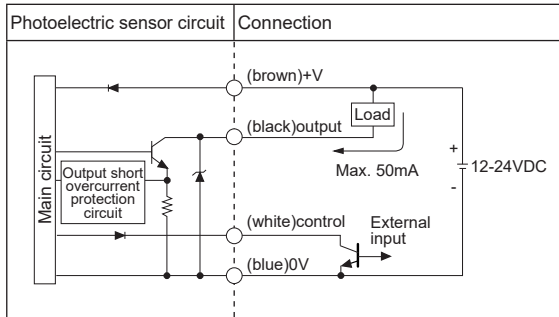
<sup>\*5</sup>: The weight includes packaging. The weight in parenthesis is for unit only.

<sup>\*</sup>: The temperature and humidity of environment resistance are rated at non-freezing or condensation.

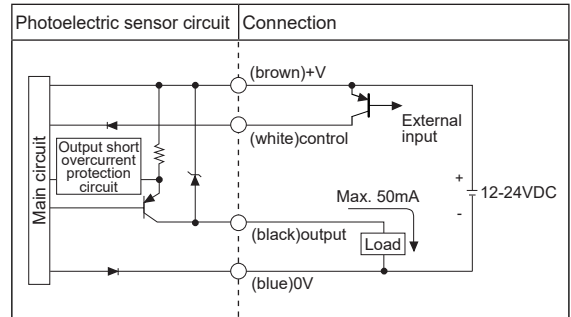
# Push Button Type Photomicro Sensors

## Control Output Diagram

### • NPN open collector output



### • PNP open collector output



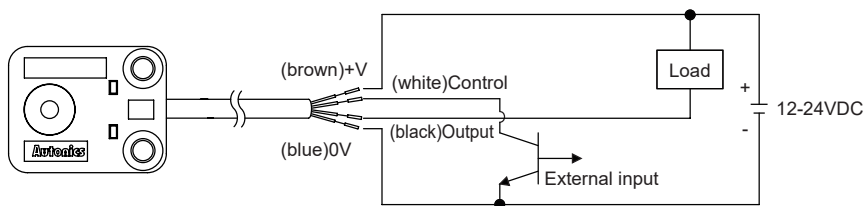
※If short-circuit the control output terminal or supply current over the rated specification, normal control signal is not output due to the output short over current protection circuit.

## Operation Mode

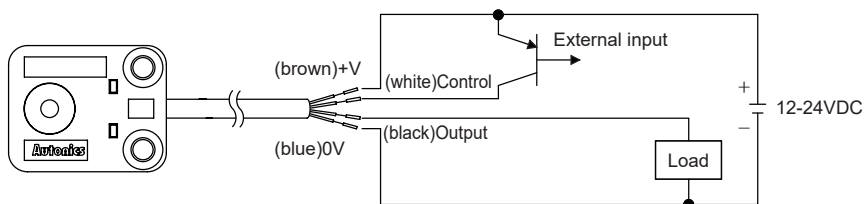
Operation mode	Light ON(output OFF when button is pushed)	Dark ON(output ON when button is pushed)
Button position	Pushed Raised	Pushed Raised
Receiver operation	Received light Interrupted light	Received light Interrupted light
Operation indicator (redLED)	ON OFF	ON OFF
Transistor output	ON OFF	ON OFF

## Connections

### • NPN open collector output



### • PNP open collector output



SENSORS

CONTROLLERS

MOTION DEVICES

SOFTWARE

(A) Photoelectric Sensors

(B) Fiber Optic Sensors

(C) LiDAR

(D) Door/Area Sensors

(E) Vision Sensors

(F) Proximity Sensors

(G) Pressure Sensors

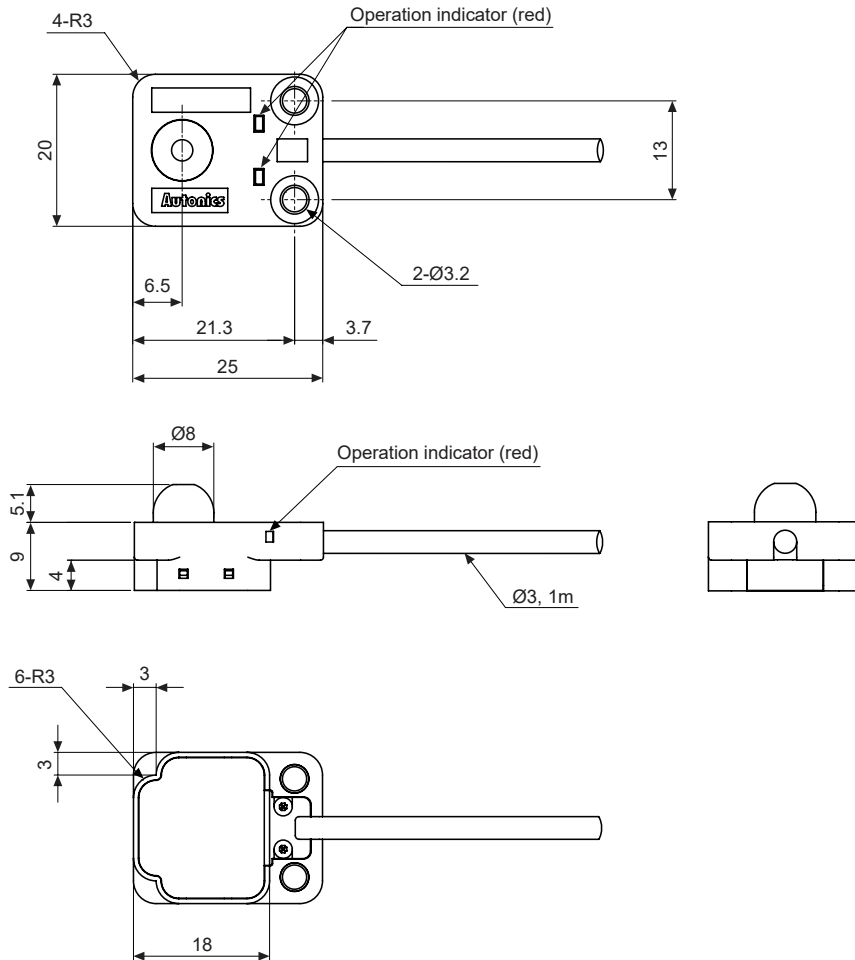
(H) Rotary Encoders

(I) Connectors/  
Connector Cables/  
Sensor Distribution  
Boxes/ Sockets

# BS5-P Series

## ■ Dimensions

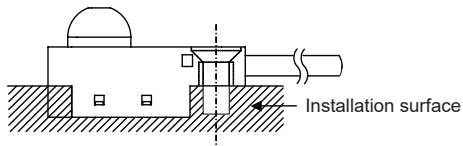
(unit: mm)



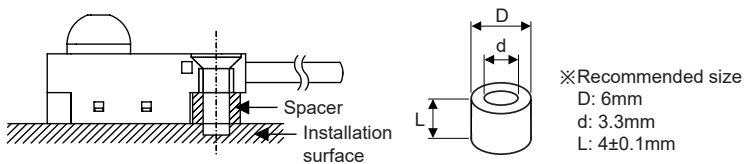
## ■ Installation

When installing the product, tighten the screw with a tightening torque of 0.59N·m. Do not pull the cable with a tensile strength of 30N or over. It may result in fire due to the broken wire.

- 1) Installation on non-flush surface  
Install the sensor after fitting the sensor in the opening as shown in the figure below.



- 2) Installation on flush surface  
Insert a spacer between the installation surface and the mounting surface of the sensor as shown in the figure below.

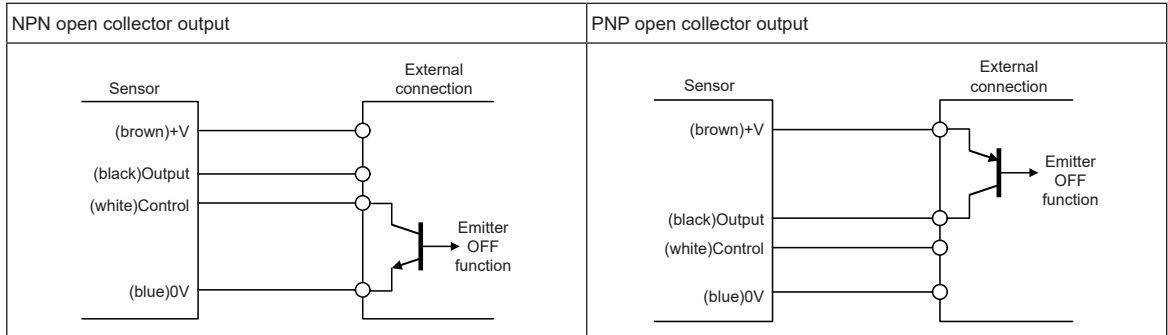


# Push Button Type Photomicro Sensors

## ■ Functions

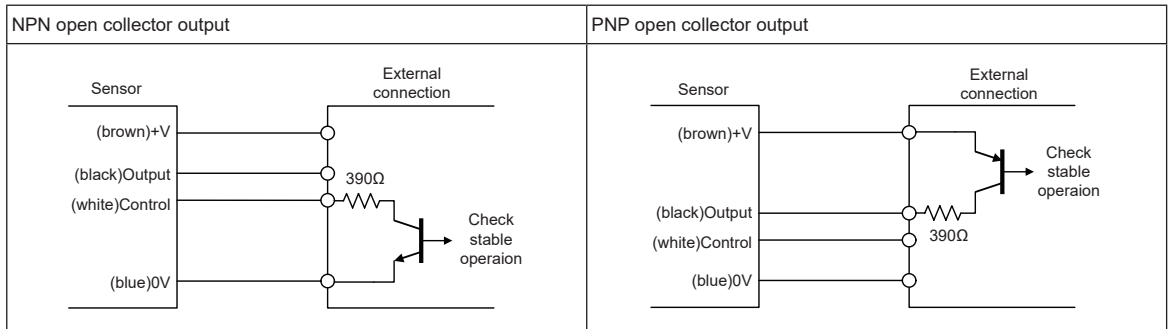
### ● Emitter OFF function

The emitter LED can be turned ON/OFF without pushing the button, to test for stable operation of the receiver.



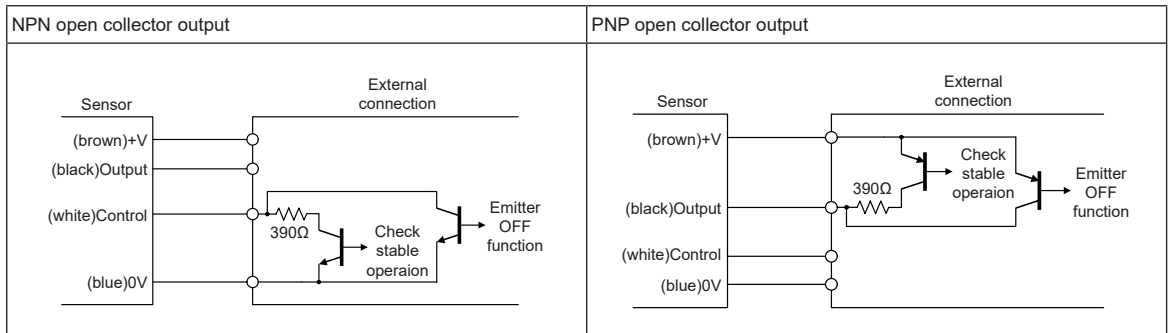
### ● Check stable operation function

Reduces the LED intensity by approximately 20% while button is not pushed, and check that the receiver is still receiving light (same transistor ON status as at 100%) This ensures that sensor will not malfunction due to changing light intensity.



### ● Simultaneous use of emitter OFF and check stable operation function

Follow the circuit diagram below:



※When using the emitter OFF function and check stable operation function simultaneously, the transistor used should be able to open and close 50mA/10V and resistance should be over 1/8W. Failure may cause product damage.

※When emitter OFF function and stable operation check function is not used, insulate the control (white) wire. Otherwise, it may result in product damage.

SENSORS

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(I) Connectors/ Connector Cables/ Sensor Distribution Boxes/ Sockets